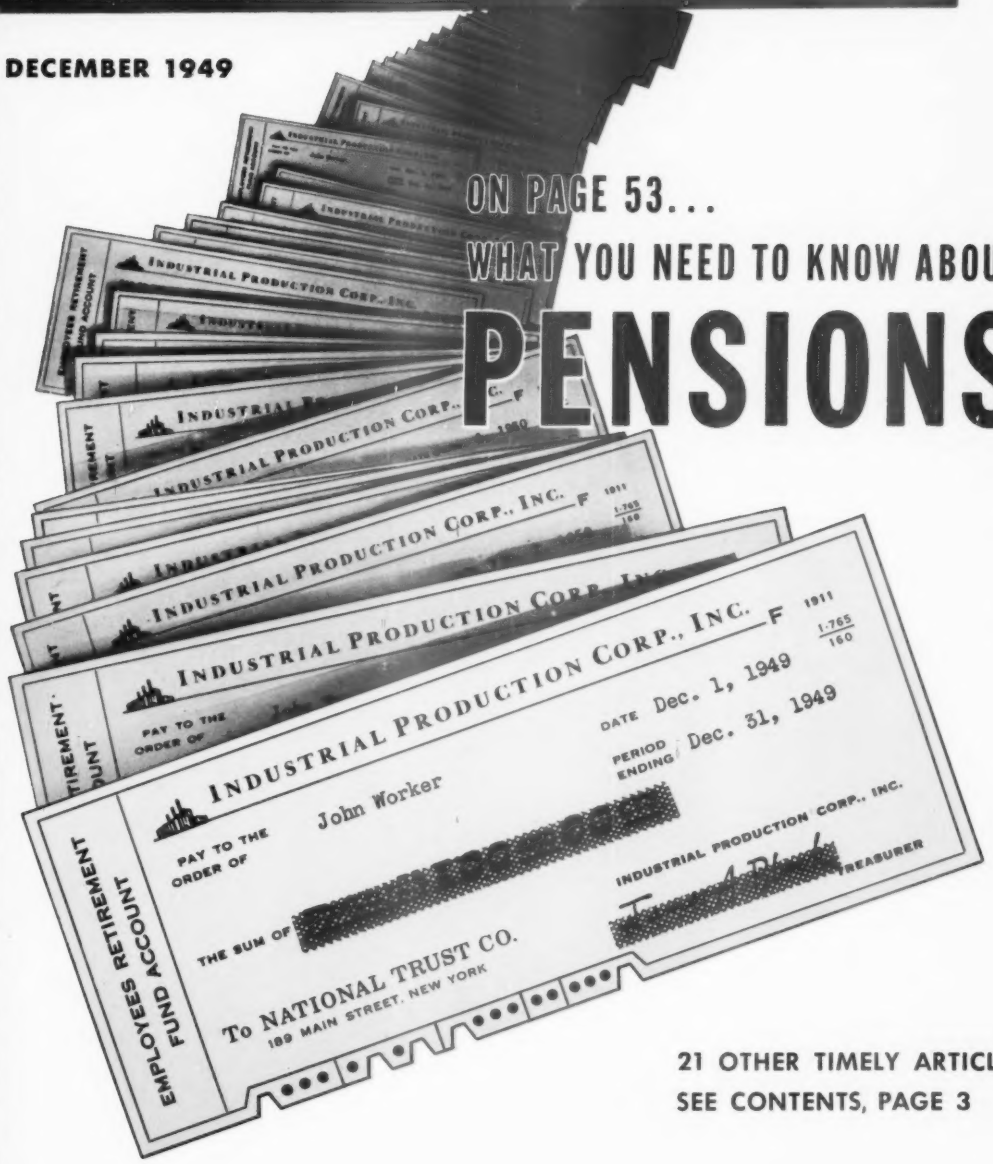
A McGRAW-HILL PUBLICATION

FACTORY

MANAGEMENT AND MAINTENANCE

DECEMBER 1949


INDUSTRIAL PRODUCTION CORP., INC.
EMPLOYEES RETIREMENT FUND ACCOUNT
INDUSTRIAL PRODUCTION CORP., INC. F 1911
1-765 / 160
PAY TO THE ORDER OF
DATE Dec. 1, 1949
PERIOD ENDING Dec. 31, 1949
PAY TO THE ORDER OF John Worker
THE SUM OF
INDUSTRIAL PRODUCTION CORP., INC.
TREASURER
To NATIONAL TRUST CO.
100 MAIN STREET, NEW YORK

ON PAGE 53...

WHAT YOU NEED TO KNOW ABOUT

PENSIONS

21 OTHER TIMELY ARTICLES
SEE CONTENTS, PAGE 3

There's Something New INSIDE*

National Electric XDUCT JUNIOR
Electrical Metallic Tubing

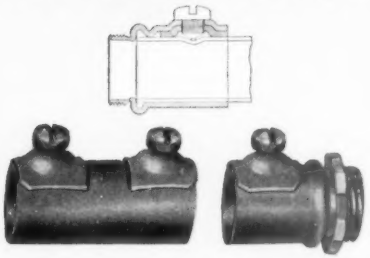
Look inside the *new* XDUCT JUNIOR and you'll see a hard, mirror-like finish.

- XDUCT JUNIOR is first electro-galvanized under an exacting control that produces a uniform, unbroken zinc coating.
- The inside is then further protected by a *complete* covering of clear enamel that will not crack or break down even under severe baking and bending. Weather elements have no effect on it.
- Exhaustive tests have proved XDUCT JUNIOR, coated with the new clear enamel, is more easily fished . . . resistance to wire pulling is definitely decreased. Appearance is improved 100% over the ordinary black enameled finish.
- The smooth, lustrous coating of clear enamel on the inside of XDUCT JUNIOR, is your assurance of permanent protection against abrasion, moisture and corrosion.

Now XDUCT JUNIOR is *better than ever!*

*Currently available on the ½" and ¾" sizes.

USE THE NE IMPROVED E.M.T. FITTINGS WITH XDUCT JUNIOR



- **Vibration proof**
- **Easy to inspect**
- **Installed with a screw driver**
- **Permanent ground**
- **Close, accurate fit**
- **One-piece, pressed-steel body**
- ***Electro-galvanized***
- **Easy to install in close quarters**

XDUCT JUNIOR and E.M.T. Fittings are listed by Underwriters' Laboratories, Inc. Sold through leading electrical wholesalers.

Write for a copy of *"New Fittings for E.M.T. are Vibration Proof."* It lists sizes and catalog numbers.

NATIONAL ELECTRIC PRODUCTS
NE
WIRING SYSTEMS 6
WIRES AND CABLES

National Electric
PRODUCTS CORPORATION
1347 CHAMBER OF COMMERCE BUILDING
PITTSBURGH 19, PENNSYLVANIA

This hose resists water absorption—lasts up to 100% longer

"Wet strength" cord adds years of life to B.F. Goodrich water hose

B. F. GOODRICH water hose is made with rubber compounds that make it highly resistant to water absorption, swelling, carcass damage.

In accelerated laboratory tests B. F. Goodrich water hose absorbed less than half as much water as other brands tested. This means longer hose life, because water can diffuse through to the carcass to cause mildew and mold.

All types of B. F. Goodrich water hose have this longer-lived compound. And all types have "wet strength" cord —specially treated long-staple cotton that actually becomes *stronger* when wetted (where synthetic fibers weaken).

Tubes—All grades and types of B. F. Goodrich water hose are fortified with Agerite, the chemical that makes rubber last longer. Most BFG water hose stands hot water: some—creamery hose for example—even take low pressure steam. Specially compounded tubes available to stand water contaminated with acids and other chemicals.

Covers—You can drag B. F. Goodrich water hose over wet concrete floors, dirt and cinder yards, use it on highways where it gets run over. It's compounded to take severe abrasion, to resist cutting and gouging. Some covers are compounded to stand oils and greases. Can be made with rubber-capped ends, that protect the carcass from moisture wicking in. Built-in nozzles and tapered ends can be dropped anywhere without doing damage.

If you use water hose don't be satisfied without knowing what developments BFG may have made in hose for your particular type of service. To make sure you get the longest life from water hose, see your local BFG distributor. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Water Hose BY
B.F. Goodrich

Ryerson Steel Service Pays 4 Ways!

1. Quick Delivery

Maintenance jobs keep moving—production delays are avoided when you call Ryerson for promptly needed steel. Thirteen conveniently located Ryerson plants mean shorter shipping distances, assure fast delivery of your requirements to any point in the nation.

2. Highest Quality

Careful specifying and checking of all stocks assures uniform high quality—Ryerson Certified Steel. Careful handling of your orders by experienced personnel assures accurate compliance with your specifications.

3. Large Stocks

With large, diversified Ryerson stocks nearby, you can cut costs by holding your own inventory at a practical working level. Ryerson stocks serve as your inventory reserve. You can draw on these stocks for almost any current need.

4. Complete Service

To help you solve your steel problems, Ryerson steel specialists will gladly counsel with you. Their recommendations are backed by more than a century of experience. You can depend on us for prompt, personal service whether you need a single bar or a carload.

Principal Products

BARS—carbon & alloy, hot rolled & cold finished
SHAFTING—cold finished, ground & polished, etc.
STRUCTURALS—channels, angles, beams, etc.
PLATES—sheared & U. M., Inland 4-Way Floor Plate
SHEETS—hot & cold rolled, many types & coatings
TUBING—seamless & welded, mechanical & boiler tubes
STAINLESS—Allegheny bars, plates, sheets, etc.
REINFORCING—bars and accessories
MACHINERY & TOOLS—for metal fabrication

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

For STEEL in a hurry call RYERSON

DECEMBER, 1949

FACTORY

MANAGEMENT AND MAINTENANCE

Publisher
ALFRED M. STAEHLE

Editors
L. C. MORROW
HARRY LEE WADDELL

Managing Editor
LEWIS K. URQUHART

Associate Editors
G. A. VAN BRUNT
CARROLL W. BOYCE
M. J. MURPHY

Field Editors
CARL G. WYDER, New York
WILLIAM S. WHEELER, Chicago
CHARLES R. SCHUBERT, Cleveland

Assistant Editors
ROBERT A. DILLEY
KAY WHITE
DORA MITCHELL
EDWIN C. MEAD

Layout Editors
GEORGE L. SMITH
ROBERT J. TUCKER

Consulting Editors
A. H. MOGENSEN
H. P. DUTTON
CHARLES B. GORDY

Washington Bureau
GEORGE E. DOYING, Jr., Director
J. M. GAMBATESE, Labor

McGraw-Hill Department of Economics
DEXTER M. KEEZER, Director

McGraw-Hill World News
RUSSELL F. ANDERSON, Editor
London, Paris, Berlin, Moscow, Prague, Bombay, Shanghai, Mexico City

McGraw-Hill Research
JOHN C. SPURR, Director

Sales Manager
H. R. MATHIAS

District Managers
G. E. POMEROY, Boston
J. S. CAWLEY, B. E. SAWYER, New York
E. J. MACAULAY, Philadelphia
R. W. GARRISON, Pittsburgh
R. C. GREINER, Cleveland
T. W. VAN WINKLE, Detroit
A. B. MARTIN, R. P. ROSE, Chicago
W. R. PANKOW, St. Louis
CARL DYSINGER, Los Angeles
J. W. OTTERSON, T. CARMODY, San Francisco
R. C. MAULTSBY, Atlanta
J. H. ALLEN, Dallas

Other offices at Washington and London

December, 1949. Volume 107, No. 12

Published monthly by McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 18, N. Y. James H. McGraw (1860-1948), Founder.

James H. McGraw, Jr., President; Curtis W. McGraw, Vice President and Treasurer; Eugene Duffield, Senior Vice President, Publications Division; Nelson Bond, Vice President and Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Entered as second-class matter July 22, 1948, at the post office at New York, N. Y., under the Act of March 3, 1879.

Factory Management and Maintenance is a consolidation of Factory and Industrial Management (including "Factory") and Maintenance Engineering. Subscription rates — United States, U. S. possessions: $3, 1 year; $4, 2 years; $5, 3 years. Canada: $5, 1 year; $8, 2 years; $10, 3 years. Pan-American countries: $6, 1 year; $10, 2 years; $12, 3 years. Other countries: $15, 1 year; $25, 2 years; $30, 3 years. Single copies, 50c in Latin America, 75c; in all other countries, $1.50. Factory Management and Maintenance solicits subscriptions only from production, maintenance, and management executives, and engineers in manufacturing plants. Please indicate company connection and title on all subscription orders. Cable address, "McGraw-Hill, New York." Member A.B.P., Member A.B.C. Copyright 1949 by McGraw-Hill Publishing Co., Inc. All rights reserved.

SPECIAL REPORTS

Looking Ahead in Labor 49
Looking Ahead in Business 50
What You Need to Know About Pensions 53
Camera Tour: Carrier Corporation Getting Ideas for Good Handling 76
FACTORY's Bear-Down-on-Production-Cost Series
8. Provide the Best in Employee Training 90
In-Plant Training Ups Output and Saves Us Money 98
Keeping Maintenance Men Up-to-Date 100
Our Supervisors Train Themselves 102
We Train Management 52 Weeks in the Year 106

EDITORIAL

America's Business Challenge 51
Labor Union Monopoly Bites All Workers *following* 114

PRODUCTION

Move Machines to Job—and Cut Your Handling Costs 60
Six-in-One Conveyor System Eliminates Long Hauls 66
Sideway Conveyor Saves Time and Space 86
Better Handling and a 20% Cut in Unit Costs 110
Relayout of 3-Story Warehouse Cuts Handling 30% 112
Key Men Keep Their 50-Year-Old Company Young 118
Inventory Control Fundamentals—*Data Sheets* 124

INDUSTRIAL RELATIONS

Mr. Wrong versus Mr. Right 70
What to Do About Rival Left- and Right-Wing Unions 74
Posters Teach "Customer Is Boss" 75
Get Ready for the Social Security Tax Boost 114
What's Happening to the Closed Shop? 116
See also SPECIAL REPORTS above

MAINTENANCE

Good Ventilation Beats Heat, Keeps Efficiency High 64
Fewer Motor Failures with Protective Enclosures 72
Light That's Right for Your Factory Offices 82
Four Ways to Lick Cold Drafts 85
How We Made Our Roof Trusses Carry More Load 88
Cut the Cost of Operating Resistance Welders 115
Board Shows Next Maintenance Job 117

DEPARTMENTS

Ideas of the Month..... 62
Tips on Human Relations..108
Operating Shorts.....120
What's New in Equipment..128
You Want to Know.....194
Labor Developments.....202
They Say and Do.....220
Books and Booklets.....242
On the Calendar.....246
Catalog Service.....252
Industrial Films — a section about what's available.....198

Behind the Byline — about this month's contributors, Page 236

NO ICE REQUIRED for Fresh Seafood Shipments

One of the most significant packaging developments in the last decade is the H & D INSULPAK*, a corrugated box in which coast-to-coast airborne shipments of pre-cooled foods are made possible—*without refrigeration*. INSULPAK now makes all America a vast potential market for seafoods of all kinds. Daily delivery of fresh, perishable foods everywhere is now accomplished by this new, insulated package. It is hoped that it will soon be available for wide-scale distribution.

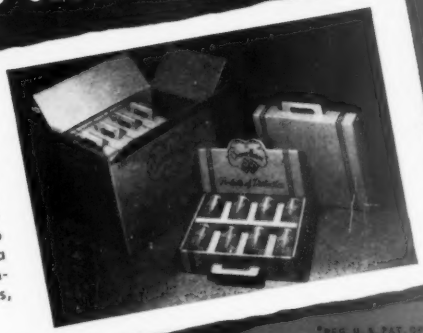
This Shipping Box TELLS and SELLS

Here's the famous Duplex shipping-display box developed by H & D for those manufacturers who wish to display their products—effectively and economically—at point of sale. It's a regular corrugated shipping box which the dealer opens to form a colorful counter display with a sales message that attracts attention and makes people buy. The H & D Duplex shipping-display box protects your product in shipment—sells your product in the retail store.

Good Packaging MAKES GOOD PRODUCTS BETTER

H & D PREPAK* Increases Unit of Sale

Many items, such as china and glassware, can be prepared at the factory into selling units that step up sales. Instead of selling one item at a time, Prepak* sells six, eight or twelve. Prepak promotes "take with" purchases, needs no repacking. The package illustrated contains a set of 8 glasses. It is made of light blue embossed corrugated board, printed in two colors, red and dark blue.



*REG. U. S. PAT. OFF.

REG. U. S. PAT. OFF.

H&D BOXES

FOR MORE INFORMATION, WRITE

HINDE & DAUCH

Authority on Packaging

Executive Offices: 4906 Decatur St., Sandusky, Ohio

FACTORIES IN:

Baltimore 13, Md. • Buffalo 6, N. Y. • Chatham, Ontario
Chicago 22, Illinois • Cleveland 2, Ohio • Detroit 27, Mich. • Gloucester, N. J. • Hoboken, N. J. • Kansas City 19, Kansas • Lenoir, N. C. • Montreal, Quebec
Richmond 12, Va. • St. Louis 15, Mo. • Sandusky, Ohio
Toronto, Ontario • Watertown, Mass.

Ask the

SEALMASTER

Engineer for this...

Insight

on Improved Bearing Performance

He will show you how . . . and why . . . SEALMASTER Ball-Bearing Units help make machines run longer . . . smoother . . . and with less maintenance. You'll learn why so many leading manufacturers and product designers use and specify SEALMASTER Ball-Bearing Units in their plants and on their products.

So, listen to the SEALMASTER bearing specialist. There is one near you. And if you have a *special* bearing problem, put it up to him for recommendation. SEALMASTERS are made in Pillow Block (shown above), Cartridge, Flange, Flange-Cartridge, Take-Up and Hanger Units as well as many special types. Write us and we'll arrange a quick appointment. Also, there's a catalog available. Write for it today.

5 Reasons Why You're Better Off with SEALMASTERS

1. *Permanently Sealed!* Felt-lined steel flinger rotating in labyrinth, prevents entry of dirt and retains proper amount of lubricant.
2. *Self-Aligning!* Bearing unit, with seals independent of the housing, can align itself in any direction without seal distortion.
3. *Prelubricated!* The bearing chamber is filled with the proper amount of grease before bearing leaves factory.
4. *No Housing Wear!* Patented locking pin and dimple prevent rotation of outer race in housing, thus eliminating housing wear . . . permit shaft alignment and position unit for relubrication.
5. *Floating Retainer!* Ball retainer is designed to float on ground inner surface of outer race . . . traps lubricant and prevents churning.

Bearing Division

STEPHEN S-A DAMSON

1 Ridgeway Avenue, Aurora, Illinois MFG. CO. Los Angeles, Calif. • Belleville, Ontario

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES

WEIGHED . . . on the run!
With Fairbanks-Morse Belt Conveyor Scales, material can be weighed in transit . . . automatically. Installed as an integral part of your belt conveyor system, these accurate units automatically indicate the weight of materials carried by the conveyor belt while in operation and show the accumulated total. There is no need for an extra weighing operation at a remote point to add to handling costs . . . impede material flow. Your Fairbanks-Morse weighing expert will be happy to give you the complete facts on the belt conveyor scale. Fairbanks, Morse & Co., Chicago 5, Ill.
FAIRBANKS-MORSE
A name worth remembering
DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS
and STANDPIPES • FARM EQUIPMENT • MAGNETOS

DOW CHEMICAL saves thousands of dollars annually with *BAKER TRUCKS*

Baker Fork Truck with Trayner-Reinhart cylinder carrier easily transports twelve 16" cylinders.

At the Pittsburg, California, plant of The Dow Chemical Company, five Baker Fork Trucks expedite handling of material in production, storage and shipping departments.

Two of these trucks, one of them fitted with a Trayner-Reinhart cylinder carrier, transport 16" cylinders of ammonia—twelve at a time—from production to warehouse and from warehouse to shipment. Trucks load cylinders directly into boxcars, or onto highway trucks.

The remaining trucks speed handling of chemical products in bags or cartons on pallets—taking them from production to storage, where they are high-tiered to conserve floor space, and from storage to shipment, where further man-hour savings are made in loading.

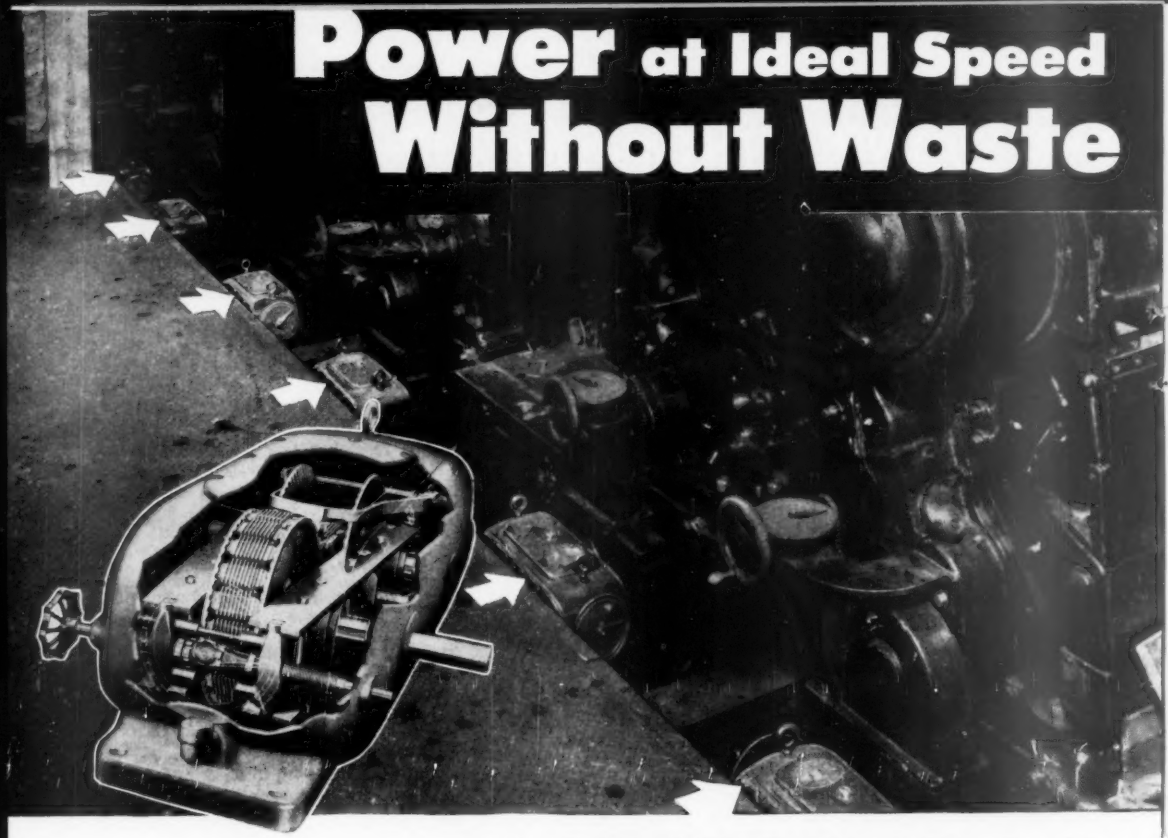
Prior to the installation of the Baker Trucks, material was transported manually and hand-stacked. Cylinders were rolled by hand, one at a time. The use of the trucks has resulted in savings of thousands of dollars annually over former methods.

Bagged material, stacked on pallets as it comes from the line, is tiered to the ceiling in storage. Cartons of finished chemical products are handled in pallet loads to save manual handling in transporting, storing, and car or truck loading.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
1218 West 80th Street • Cleveland 2, Ohio
In Canada: Railway and Power Engineering Corp., Ltd.

Baker INDUSTRIAL TRUCKS

Power at Ideal Speed Without Waste



Six arrows point to six Link-Belt H-1 P.I.V. Variable Speed Drives with mechanical remote handwheel control, on black printing units of new Wood newspaper press.

with LINK-BELT P. I. V. VARIABLE SPEED DRIVE

Link-Belt P.I.V. Variable Speed Drive is available in vertical or horizontal housings, with or without extra reduction gears, and motor, or without housing, for built-in purposes.

Supplied in eight types, up to 25 h.p., fully described in Data Book 1874-B. Send for your copy *NOW!*

You can run any machine at its ideal speed for maximum production by using the Link-Belt P.I.V. Variable Speed Drive.

This unique device furnishes positive power transmission through a chain which automatically forms its own teeth, assuring transmission of every r.p.m. without the possibility of slip or wasted power.

Output speed is instantly variable while the machine is running, and speed ratios are infinite, without steps. Once adjusted, the speed ratio remains constant indefinitely—until changed by means of the convenient hand wheel.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 11,610

LINK-BELT

THE SYMBOL OF QUALITY — LB — LINK-BELT

Power Transmission Machinery

"THE COMPLETE LINE"

TYPES OF LINK-BELT POWER TRANSMISSION MACHINERY

Precision Steel Roller Chain	P.I.V. Variable Speed Drives
Silverstreak Silent Chain	Fluid Drives
Steel and Malleable Chain	V-Belt Drives
Worm Gear Drives	Ball Bearings
Herringbone Gear Drives	Roller Bearings
Helical Gear Drives	Babbitted Bearings
Gearmotors	Couplings, Clutches, Collars, etc.

A completely rebuilt motor is tested with dynamometer. This machine applies low voltage and overloads exactly as in actual usage.

Complete Facilities

KEEP ELECTRIC MOTORS ON THE JOB

California Electric Works, San Diego, features modern equipment, large stock of parts, 2 shift operation, 24 hour service in emergencies to give top-flight Allis-Chalmers Certified Service

IN SAN DIEGO, and *every* major industrial center in the United States you will find an outstanding, independent Allis-Chalmers Certified Service shop.

These shops have been carefully picked for their experience, highly skilled workmen, modern equipment and business reputation. Each uses nothing but factory approved methods and parts.

So when you need service on electrical equipment, call the nearest Allis-Chalmers Certified Service shop. You can be sure of fine workmanship, fast service and fair prices.

GOOD SOURCE FOR NEW MOTORS, TOO

Your Allis-Chalmers Certified Service Shop or Authorized Dealer can give you the same fast, dependable delivery on new motors. Whichever you need, new motors or service on your present equipment, you can depend on your Allis-Chalmers Certified Service shop. A-2885

ALLIS-CHALMERS, 1078A SO. 70 ST.
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks

ALLIS-CHALMERS

New ELWELL-PARKER Gas Fork Truck...

offers many advantages!

All-Climate Engine—being air cooled, it is ready for use anywhere, any time.

Simplified Controls—of the automotive type; only one gear lever for high, low, forward, and reverse; one lever for lift.

Greater Tilting Angle—5° forward, and 10° backward for greater load stability turning corners.

High Speed Lift & Lowering—30 f.p.m. plus.

Double, Separated Lifting Cylinders—greatly improve vision of load.

Low Hydraulic Pressure—less than 1,000 p.s.i. in cylinders reduces liability of leakage.

Cushion Tires (Optional)—retain minimum truck width and add smooth riding qualities without puncture liability of high pressure pneumatics.

Sturdier Frame—center-silled, cross-ribbed type, assures permanent alignment.

Easier Steering—due to caster-type trail axle and compensated steering.

Worm Drive Axle—fewer parts; same housing accommodates higher gear ratio where necessary, due to extreme grade operations.

Easy Servicing—all parts readily accessible without general dismantling, avoiding need for stand-by trucks.

GF-26T Fork Truck is a member of the EPE **AIR-RIGHTS** SERIES

Because it is gas-powered, this new E-P fork truck is ideal under any of the following conditions: (1) longer runs, including outdoor use; (2) infrequent starting in the total operating cycle; (3) seasonal operation, where truck is not used every month. (Otherwise E-P electric trucks are more economical.)

Available for immediate delivery, this truck meets the uncompromising standards dictated by 40 years' successful experience, satisfying operational requirements of modern industries. The Elwell-Parker Electric Co., 4323 St. Clair Avenue, Cleveland 3, Ohio.

Write for illustrated bulletin on this New Truck

ELWELL-PARKER

Established 1893

POWER INDUSTRIAL TRUCKS

© 1949, The Elwell-Parker Electric Co.

"Are you telling Me that I don't know how to Count?"

—exploded the chief engineer

NO *SIR*, chief — not *you!* Only meant to suggest that your swell new machine might do itself much prouder, saleswise, if it only — so to speak — could "learn to count." That's all.

But that's a lot! Many machines that have been "taught to count" . . . with a Veeder-Root Counter built-in as original equipment . . . have shown some startling sales-spurts. For this unique feature gives any product a new usefulness, a new sales appeal, a new distinction from competition. And there *are* golden probabilities that *your own product* has hidden talents in functional service which a built-in Veeder-Root Counter can build up into something big. Such talents may hide themselves from you . . . but not from the creative, mathematical eye of a Counting House engineer. He'll be glad to take a look, any time you say.

NEW GENERAL-PURPOSE COUNTER

is modern, streamlined, compact . . . fits readily into most design-limits. Attractive to look at, easy to read. Send for 8-page Condensed Catalog and complete spec-sheet on this counter, No. 1260. Write to

Veeder-Root COUNTERS

VEEDER-ROOT INC., HARTFORD 2, CONNECTICUT

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Road, Dundee, Scotland.

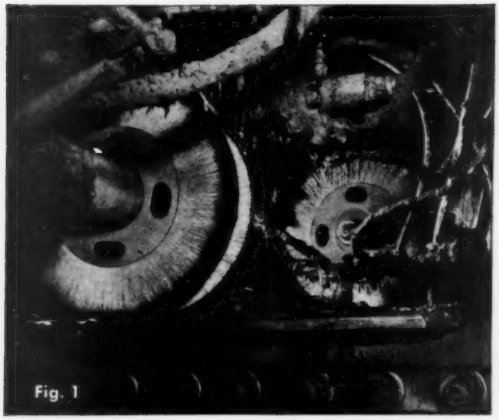


Fig. 1

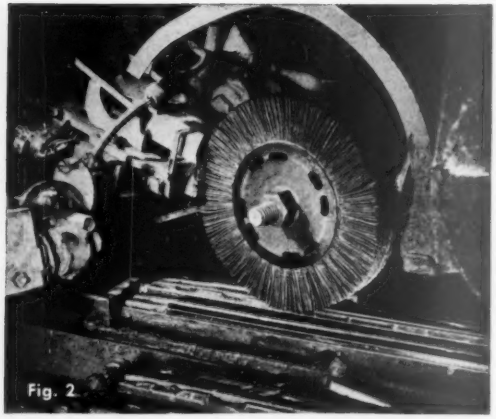
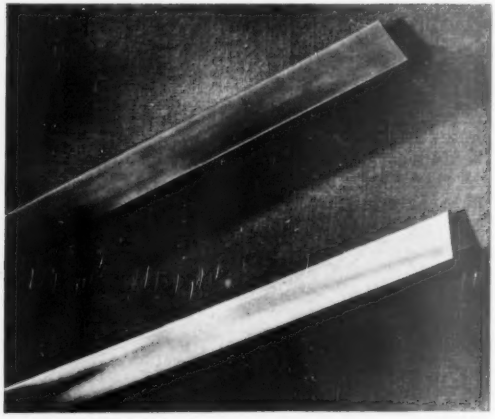


Fig. 2

HERE'S HOW TO CUT COSTS AND GET A BETTER FINISH ON STAINLESS STEEL



NEW OSBORN BUFFBRUSHES* PRODUCE HIGH LUSTRE FINISH ON STAINLESS STEEL PARTS AT FAR LOWER UNIT COST...

TWO types of Osborn Power Driven Brushes remove forming marks and produce the satin-smooth, high lustre finish found on the stainless steel window divider bars used to glamorize motor cars. Here's how it's done.

Divider bar is placed in a holder and moves on a continuous chain through the polishing line. Bar is first brushed by Osborn Monarch® Tampico Power Brushes (Fig. 1), with a spray type abrasive compound, preparing the surface for final color buffing.

Osborn's new power driven Buffbrushes (Fig. 2) and a bar compound complete the polishing operation. Approximately 6500 stainless steel window divider bars are finished by this method per day.

Time and money-saving ideas such as this are the stock-in-trade of Osborn sales engineers. This premium service costs you nothing—*can* save you hundreds, yes, *thousands* of dollars. For complete information, write—

THE OSBORN MANUFACTURING COMPANY

Dept. 215, 5401 Hamilton Avenue *Cleveland 14, Ohio*

**Trade Mark*

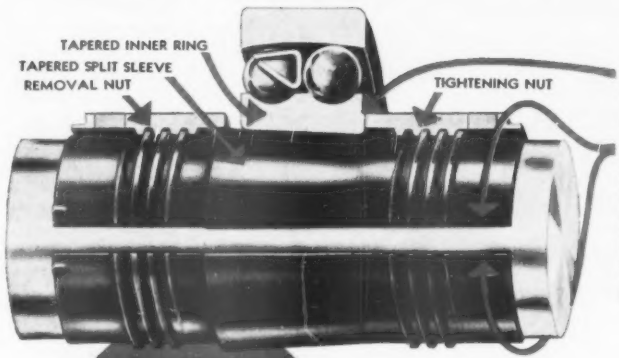
Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES

SOMETHING NEW!

SKF introduces the SUA UNIT PILLOW BLOCK featuring a tight fit between bearing and shaft

Here's How It Works



TIGHT FIT results when the tightening nut pushes the tapered inner ring over the tapered split sleeve.

CONCENTRIC GRIP is firm and positive—as the split sleeve contracts and wraps around the shaft. Removal is accomplished by reversing the process—with tightening nut loosened, removal nut pushes inner ring off the sleeve.

ON or OFF *in a few seconds*

The *new* SKF SUA Unit Pillow Block is completely assembled, lubricated and ready for immediate use. Available in "free" or "held" types and in shaft sizes from $1\frac{7}{16}$" to $2\frac{7}{16}$".

Its SKF-exclusive Align-O-Seals prevent lubricant leakage and dirt intrusion. Designated as type SUA with ball bearings—and type SUAR with spherical roller bearings.

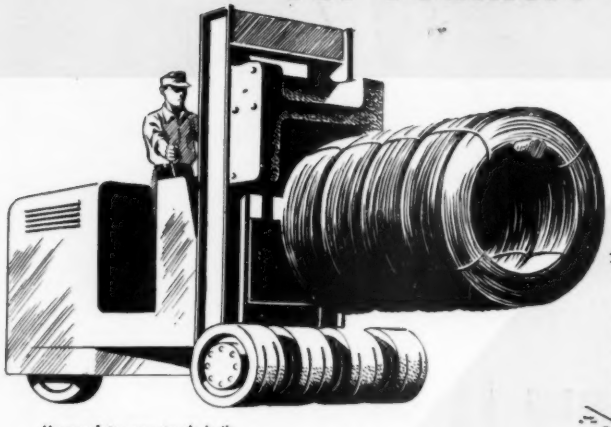
No exposed bearing . . . no lock screws to raise troublesome burrs on the shaft . . . the nut is locked to the sleeve . . . and even though the shaft vibrates, the concentric grip will not loosen.

For more information, check your local authorized SKF Distributor, or write: SKF Industries, Inc., Philadelphia 32, Pa. 6681

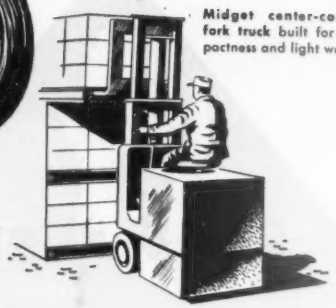
Bearings and pillow blocks engineered by SKF

INDUSTRIAL TRUCKS

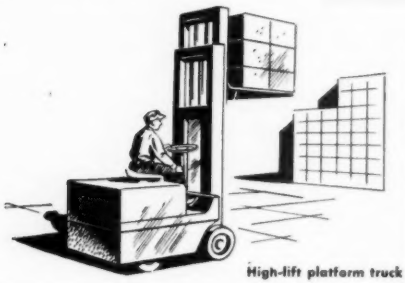
For Feathers or Forgings...



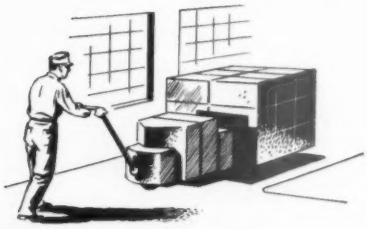
Heavy-duty ram truck built to handle loads up to 15 tons.



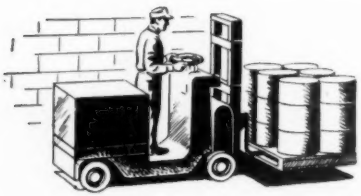
Midget center-control fork truck built for compactness and light weight.



High-lift platform truck



Powered hand truck

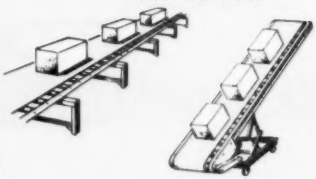


Fork truck

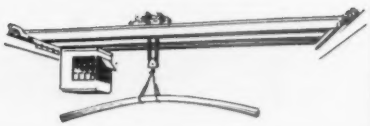
Low-lift platform truck

Everything electrical for MATERIALS HANDLING

CONVEYOR DRIVES



CRANE DRIVES



POWERED by G.E.

TO HELP CUT YOUR MATERIALS HANDLING COSTS

Operating economy, long life, noiseless operation, flexibility of control—these are the major advantages of battery-powered trucks recognized by all industry. In fact, today, the demands of low-cost production make the use of these economical handling devices a practical necessity.

An "old-timer" in this field, General Electric manufactures a complete line of electric equipment for industrial trucks—motors and control for all types and sizes of battery trucks . . . and chargers, both rectifier and rotating.

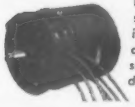
Electrical components can make or break a battery truck. It will pay you to specify equipment of proven quality. Be certain that the trucks you choose are G-E equipped and then insure their efficient operation with G-E battery chargers. ***Apparatus Department, General Electric Company, Schenectady 5, N. Y.***

SEE the latest techniques and equipment in this new film

As a service to industry, General Electric has produced an unbiased, authoritative movie* covering in detail the latest techniques and equipment used in the materials handling field. Write or call your equipment supplier or G-E representative and have this film made available to you and your staff—*without cost or obligation.*

*Part of G.E.'s MORE POWER TO AMERICA program; film is titled "Materials Handling — in Receiving, Warehousing and Shipping."

INDUSTRIAL TRUCK DRIVES



NEW BT Truck Motor. Designed specifically for the battery-truck industry this high-efficiency, small-diameter, round-frame motor withstands heavy overloads and permits dependable, long-life service.

NEW Master Switch. This four-point foot- or hand-operated master switch is enclosed in a dust-tight cast-iron case which thoroughly protects the contacts from contamination—providing long life and reliable operation.

Magnetic Control. Sturdy contactors specially designed for battery-truck service enable this control to provide smooth, trouble-free performance. Equipments for larger trucks may be designed to include time control, acceleration, anti-plugging, and dynamic braking.

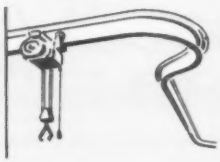
BATTERY CHARGING EQUIPMENT

G.E. offers rectifier or motor-generator type charging units to meet your particular requirements—multiple-circuit units for use in a central charging room or single-circuit units for on-the-job charging. All equipment provides precise control for automatic charging to suit individual battery characteristics.

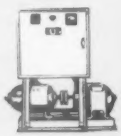
GENERAL ELECTRIC

668-72

HOIST DRIVES



INDUSTRIAL TRUCK DRIVES & BATTERY CHARGERS



Here's REAL Quality Control!

DO YOU HAVE this HANDBOOK?

We are referring to the 176-page book labeled "The Tool Steels of Allegheny Ludlum." It covers LXX, DBL-2, Super Panther, Deward, Saratoga, Huron, Ontario, Sagamore, Potomac, Pompton, Seminole, Utica, and other famous A-L grades. *Get your copy.*

ADDRESS DEPT. F-82

That block or bar or rod of quality tool steel you received from Allegheny Ludlum . . . had to run the gamut of our vigilance committee right up to shipment time. You probably weren't here to watch the technically planned mill procedure, the laboratory controls, and the inspections—but you can quickly appreciate the value of our dozen or more quality safeguards, once the steel goes into service.

Consider, for example, the supersonic reflectoscope. It's uncanny how that ferrets out any internal flaw.

This daily ritual of checking, testing, and inspecting at the various stages of production means that, in effect, we are operating our own "Bureau of Standards." By thus insuring quality, we protect you—the customer. You get better results.

For sound, clean, tool and die steels —uniformly accurate in analysis, structure, hardness, and size—call A-L.

ALLEGHENY LUDLUM
STEEL CORPORATION
Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854

AL

W&D 2492

ONCE again the many ways in which workers and management alike are benefited by Pittsburgh COLOR DYNAMICS are demonstrated in the plant of McDonnell & Miller, Inc., of Chicago, Ill. This organization is well-known for its specialization in the manufacture of boiler water-level controls and equipment.

Experiences of this company with COLOR DYNAMICS, Pittsburgh's scientific painting system based upon the principles of the *energy in color*, are summarized in this letter from Leo J. Kmiecik, Vice-President in Charge of Manufacturing.

"Because of our interest in what we in plant management call 'good housekeeping,'" writes Mr. Kmiecik, "after consulting with your representative we decided to give all machine tools in our Tool Section the 'COLOR DYNAMICS treatment.'

"Painting in the toolroom was hardly completed before the men in other divisions asked that we paint their departments in similar manner. As a result, our entire plant has been painted according to COLOR DYNAMICS with marvelous results.

"Morale of workers was greatly improved. For one thing, eye-strain among them was immediately relieved. They also take a far greater pride in keeping machines cleaned. We have also noticed that their personal appearance has improved.

"Yes, we are very much 'sold' on the results obtained from our nominal investment in COLOR DYNAMICS and we'll be glad to show our plant to anyone interested in seeing what we have done."

Your plant may need Pittsburgh COLOR DYNAMICS. Why not test the value of this painting method by applying it on a machine or two—or in a complete department? We'll be glad to make a COLOR DYNAMICS survey of your property on request without obligations on your part.

There's a Pittsburgh Paint For Every Painting Need

WALLHIDE—available in four types: **FLAT**—a velvet-like finish that is beautiful and restful; **SEMI-GLOSS**—with higher sheen; **GLOSS**—with enamel-like sheen; **PBX**—extra-durable finish can be washed frequently.

•

LAVAX PBX ENAMEL—for woodwork, furniture or metal trim. Brushes out freely and easily to a smooth, satin finish.

•

LAVAX MACHINERY ENAMEL—a durable finish impervious to grease, grime or dirt.

•

FLORHIDE—for floor surfaces. Quick-drying, tough, can be scrubbed with soap solutions.

SEND FOR A COPY OF THIS BOOK!

Pittsburgh Plate Glass Co., Paint Div., Department FA12-49, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your new revised and enlarged Booklet "*Color Dynamics In Industry.*"

☐ Please have your representative call for a Color Dynamics Survey of our property without obligation on our part.

Name _____

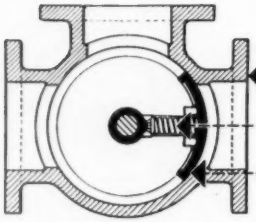
Street _____

City _____ County _____ State _____

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

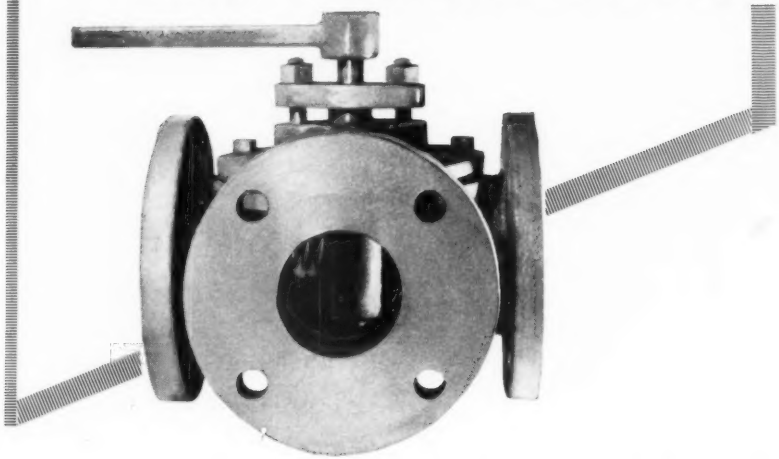
PITTSBURGH PLATE GLASS COMPANY



A Body,
A Spring and
A Rotating Gate
Make The

BELFIELD TRANSFER VALVE

Easy To Maintain and Repair



It's as simple as that! There are no other parts to bother about . . . and disassembly for cleaning requires only the removal of four nuts.

Applications for the Belfield Transfer Valve are found throughout industry . . . particularly where a thick or heavy fluid is being moved from one point to another by means of piping.

It is available in Cast Iron, Bronze, Galvanized Cast Iron Bodies, with Bronze, Iron or Monel Trim. Sizes from 2″ to 12″ . . . two way or straight through . . . screwed or flanged.

Call in your local Honeywell engineer for detailed information about this transfer valve and such other Belfield Process Control Specialties as Hi-Lift Hand Control Valves, Liquid Level Devices, Steam-Jacketed Rotary Cocks and the Belfield Space-Saving Bypass.

Write, today, for a copy of Bulletin #100-1

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BELFIELD VALVE DIVISION
Philadelphia 44, Pa.
Offices in 73 principal cities of the United States, Canada and throughout the world

BELFIELD
MH WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL MH
VALVES

MINNEAPOLIS Honeywell — Process Control Specialties — Belfield VALVES

Make this note on your Xmas List:

All through the dazzling displays, from toys to TV sets, you'll see . . . time and time again . . . the familiar face of the American Phillips Cross Recessed Head Screw. And whenever you see it, you're looking at a top product in its line . . . one that's obviously an exceptionally good buy because it's put together to stay, to withstand vibration and strenuous daily use. What's more, you can be sure that the lucky one who gets your gift *will see it the same way.*

Yes, American Phillips Screws are one of the most reliable outward signs of built-in quality. And if *you* are concerned with the manufacture of any product, then you may well have a far happier New Year in store for you, if you will let us show you how . . . in your own plant as in all others . . . *American Phillips Screws always cost least to use.*

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN SCREW COMPANY, Main Office: Providence 1, R. I.
Plants at Willimantic, Conn., and Norristown, Pa.
Warehouses at: *Chicago 11:* 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

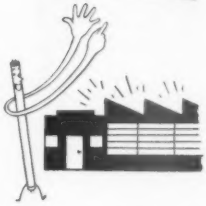
AMERICAN PHILLIPS *Screws*

ALL TYPES
ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

LIGHTING NEWS

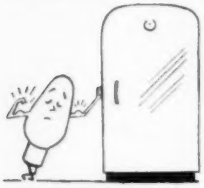
New lamps—new uses—money-saving ideas

FROM G-E LAMPS



SIX BASIC WAYS TO LIGHT YOUR FACTORY — Analyzing hundreds of factories, G-E engineers found that most lighting needs can be met by one of six basic systems — with adaptations for each plant. Systems are described in a new free booklet, "Six Recommended Lighting Systems for Industry." Write General Electric, Div. 166-F12, Nela Park, Cleveland 12, Ohio.

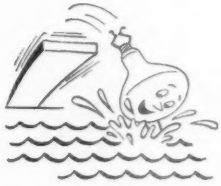
FASTER WAY TO INSPECT FINISHES — General Electric lighting experts have developed a better method of inspecting automobile bodies for a large manufacturer. As cars pass between vertical banks of fluorescent lamps, inspectors watch lamp reflections on car bodies. Rippled reflection indicates a slight dent or paint imperfection. The manufacturer reports new method saves time, is much more accurate.

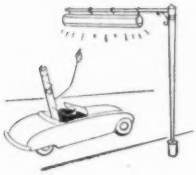


"HOUSEWIFE-PROOF" LAMP MAKES BOW — A new 10-watt pilot lamp for ranges, radios, freezers, etc., recently announced by General Electric is designed to withstand all the jolts and jars that a housewife can give a home appliance. The new lamp should last at least five years under normal usage.

BETTER OUTDOOR SPOTLAMP READY — It's the first reflector-type spotlamp that can be used outdoors and the first lamp with heat-resistant glass to sport a light-frost finish (which makes a sharper beam). Lamp is rated 300 watts, about 12,500 candlepower. Suggested uses: service stations, plant yard lighting.

NEW INFRARED LAMP IS "SPLASH-PROOF" — A new heat lamp that resists breakage from splashing liquids has just been announced by General Electric. Rated 375 watts, the new lamp is made of heat-resistant glass, can operate in high-temperature ovens. For details on G-E infrared lamps, write for free booklet, "Bake, Dry, Heat with G-E Industrial Infrared Lamps." General Electric, Nela Park, Div. 166-F12, Cleveland 12, Ohio.





SLIMLINE FOR STREETLIGHTS — A line of roadway lighting fixtures using slimline fluorescent lamps was recently announced by G.E.'s Apparatus Dept. New fixtures permit mounting slimline lamps from standard poles, at fence height along bridges, and in tunnels. Major advantages: reduced glare, longer lamp life.

For complete information on lamps and lighting, phone your local General Electric supplier.

You can put your confidence in—

GENERAL ELECTRIC

Why a Can of Paint is Like a Suit of Clothes

On interior painting jobs, the surest way to get greatest satisfaction for your money is to do what you do when you're buying a suit of clothes. TRY IT ON!

Yes . . . make a simple, comparative test of various brands of good paints. *Try them on your wall.* See what a gallon of each will do for you . . . how far each goes, how well it hides, how well it looks, how long it takes to apply.

On a test like this we're willing to stack up "Barreled Sunlight" against all other brands of paint you want to choose. And we're confident you'll find that "Barreled Sunlight" will give you the best results . . . *at lowest cost* . . . for four good reasons:

(1) "Barreled Sunlight" gives you "6 for 5" . . . up to 20% more spreading capacity per gallon. (2) "Barreled Sunlight" hides better . . . often requires only one coat for a topnotch repaint job. (3) "Barreled Sunlight" keeps its "fresh-painted" look longer. (4) "Barreled Sunlight" *goes on* faster . . . makes important savings on labor which today averages a good 80% of total painting costs.

Talk it over with a "Barreled Sunlight" representative. Let him show you how to get a painting job that's a "perfect fit" both physically and financially. Write.

U. S. GUTTA PERCHA PAINT COMPANY
2-L Dudley Street, Providence, Rhode Island

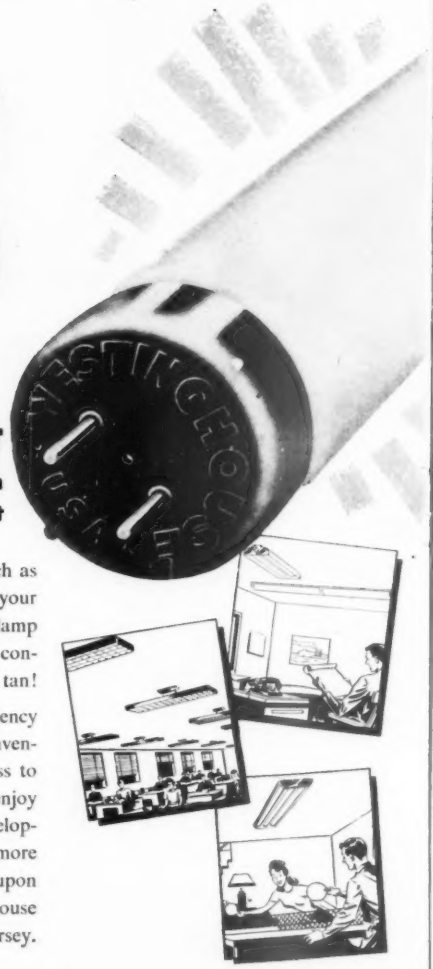
Barreled Sunlight *Paints*

In whitest white or clean, clear, pleasing colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

WESTINGHOUSE ADDS A NEW TO FLUORESCENT

the FLUORESCENT SUN LAMP



ANOTHER WESTINGHOUSE FIRST

For the first time . . . **Fluorescent Installations Can Combine Light for Seeing and Sunshine Ultraviolet**

Here's a totally new kind of sun lamp . . . different from any ever made! At last it's practical to *bathe a whole room* with cool ultraviolet rays that stimulate health-building Vitamin D, or to provide sun-tanning intensities for personal applications of short duration.

In wide-area radiation, lower intensities are utilized for longer periods. Thus in general offices, factories, schools, homes, amusement and recreation areas, everyone can easily and pleasantly get a full measure of beneficial ultraviolet while at work or play. For quick individual sun tanning, such as in your own private office or in your home, the use of inexpensive lamp holders or reflectors provides a convenient means for you to get a real tan!

The lamp has five times the efficiency and four times the life of the conventional sun lamp. And it costs less to buy and less to run! Be first to enjoy this *exclusive* Westinghouse development. Ask your lamp supplier for more details . . . or merely mail the coupon at the right. Lamp Div., Westinghouse Electric Corp., Bloomfield, New Jersey.

DIMENSION LIGHTING

OTHER

Westinghouse Developments

SAVE 2/3
ON LAMP COSTS

Leadership in fluorescent lighting is not limited to the amazing new sun lamp. Take the regular line, for example. The life of the Westinghouse fluorescent lamp has been extended 66⅔%. They will last 2½ years in average store installations, 3 years in average one-shift factory or office installations. You save ⅔ on lamp costs, and ⅔ on time spent replacing burned-out lamps!

Lamp. Div., Westinghouse Electric Corporation, Bloomfield, N. J.

Please supply—

- ☐ More information on the new Westinghouse fluorescent sun lamp.
- ☐ More information on the long-life Westinghouse fluorescent lamps.

NAME.....

COMPANY.....

ADDRESS.....

FM

Have you looked for lower

THE COMPLETE CHAIN BELT LINE

Baldwin-Rex Roller Chains
Baldwin-Rex Double Pitch Roller Chains
Baldwin-Rex CPS Flat Top Chains
Rex Cast & Steel Detachable Chains
Rex Pintle Chains
Rex H-Type Drive Chains
Rex H-Type Conveyor Chains
Rex Refuse & Log Haul Chains
Rex Transfer Chains
Rex Ley Bushed Chains
Rex Combination Chains
Rex Durobar Chains
Rex Cast Roller Chains
Rex Double-Flex Chains
Rex Sugar Mill Chains
Rex Chabelco Steel Chains
Rex Offset Side Bar Roller Chains
Rex Table Top Conveyor Chains
Rex Drop Forged Chains
Rex Drag Chains
Rex Cast Sprockets
Baldwin-Rex Cut Tooth Sprockets
Baldwin-Rex Flexible Coupling
and a complete line of chain attachments

If you're looking for lower costs, consider these points. Have you thoroughly explored the possibilities for cost reduction and improved performance offered by properly applied power transmission, timing, and conveying equipment?

Perhaps you're using the same basic methods . . . the same type equipment for these important functions that has been used for years.

Maybe it's still the best, but you owe it to yourself and your customer to be sure that the product you use is the lowest in cost, consistent with quality and performance.

For example, your equipment may be overchained. A lighter chain may do the job just as well with important savings to you and the customer. A cast chain instead of a steel chain again may do the job as well at lower cost.

Conversely, your design may be underchained and liable to premature breakdown, resulting in far greater overall cost to you.

Perhaps you are using other methods of transmitting power or timing operations and a chain drive can effect substantial savings in space, costs and weight.

CHAIN BELT REX COMPANY

CHAIN BELT COMPANY

HERE*

costs?

There is no one best or stock answer to the problem of transmitting power, timing operations or conveying materials. That is why we at Chain Belt Company feel that we can be of practical assistance to you in designing for lower cost. Because we manufacture a *complete line of chains,* both cast and steel, with conveying attachments for every service, we can help you select the chain that is exactly right for your application.

If the operating conditions or material to be handled are such that a cast chain is indicated, we have the exact chain that will best fit the need. Where speeds and horsepower requirements demand a finished steel roller chain, again our complete line contains the answer.

Our Field Engineers plus our Plant Engineers are well equipped to help you in selection and application of Rex and Baldwin-Rex Chains. They often have been able to help effect substantial savings and increase plant efficiency through the flexibility of our complete line and their years of practical experience. Call or write the Chain Belt Company Field Office near you or write direct to Chain Belt Company, 1667 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT DISTRICT OFFICES

Atlanta	Midland
Birmingham	Milwaukee
Boston	Minneapolis
Buffalo	New York
Chicago	Philadelphia
Cincinnati	Pittsburgh
Cleveland	Portland
Dallas	Richmond
Detroit	Salt Lake City
Houston	St. Louis
Indianapolis	San Francisco
Jacksonville	Seattle
Kansas City	Springfield
Los Angeles	Tulsa
Louisville	Worcester

Here is a composite view of Chain Belt Company's manufacturing facilities. From these plants comes a line of chains unsurpassed for completeness . . . chains that have been serving industry everywhere for over 50 years.

BALDWIN-DUCKWORTH DIVISION
Springfield 2, Massachusetts

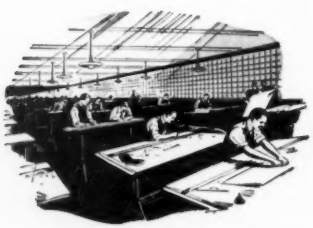
REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wisconsin

BALDWIN-REX

A note on Abrasives

Improved Abrasive Tools help step up production...cut costs

New production efficiencies and economies are being realized almost daily as a direct result of technical advances in abrasive products. At The Carborundum Company these improvements do not just "happen." They are derived from a carefully formulated program. Product Development...an important activity here...pools specialized knowledge, experience and skill. It probes into the performance of present products...seeks and finds possibilities for doing the job better. It examines and compares the action of bonded and coated products under every conceivable production condition. It studies and restudies technical advances in machines and methods. CARBORUNDUM'S development staff turns up ideas that can be incorporated into new products as well as better ways of using present products. Both are important to production management. As a user of abrasive products by CARBORUNDUM, you receive the direct benefit of all advances in product development. This —together with abrasive engineering and other services—offers another reason for specifying and buying abrasive tools produced by CARBORUNDUM ...the leading name in abrasives. The Carborundum Company, Niagara Falls, New York.



The only complete line of Abrasive Tools is

CARBORUNDUM

TRADE MARK

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company

Engineering News
ON ABRASIVE PRODUCTS

Belt Backstand Idler Techniques Effect Operating Cost Reduction

Substantially increased output, lower unit costs and improved finishes are influencing more metal working plants to switch to belt backstand idlers for grinding and finishing flat and contoured surfaces of both small and medium weight pieces. In many factories where set-up wheels were formerly used, conversion from 25 to 100% to the backstand technique has been effected. While these methods normally involve grinding speeds of 6500 to 7000 SFPM with glue-bonded abrasive cloth belts, speeds of 10,000 SFPM are being used widely today with resin bonded belts.

As a result of recent wide-spread experiences with belt backstand idler techniques, our trained staff of engineers is equipped to guide users in making the best use of this equipment. In all cases they are able to recommend applications and abrasive materials to meet your requirements.

Better Work with Cylindrical and Crankshaft Grinding

Cylindrical grinding wheels including crankshaft wheels by CARBORUNDUM are engineered to provide the tools required for maintenance of efficient production rates, rapid stock removal and fine surface finish.

V11 bond represents the most recent contribution to this class of grinding. These wheels are designed with a *specific structural balance* which when combined with the proper grain size and abrasive type offers the following advantages to both operator and management:

1. Cool and free cutting characteristics promote more efficient production of superior finishes and close tolerances. This is of great importance in operations involving both OD and shoulder or face grinding.
2. Designed structural balance permits continuous fast cutting rates which promote high production.
3. Fast cutting qualities combined with long life save dollars in operator and machine time as well as abrasive costs.
4. Engineered uniformity of the abrasive and bond components of these wheels permits close control of part size and form.
5. Self dressing characteristics provide longer periods of use between dressings . . . save dressing time, usable abrasive and dressing tools.
6. Ability to grind a wide range of materials makes possible savings in inventories of special wheels and minimizes requirements for premium priced abrasives.
7. Savings in set-up time are made possible because the versatility of V11 bond wheels permits efficient grinding of many varieties of work, making it unnecessary to change wheels when changing from one job to another.

For prompt attention to abrasive problems, call your nearest branch office of The Carborundum Company.

COATED PRODUCTS — SHEETS • ROLLS • BELTS • DISCS SPECIAL SHAPES

BONDED PRODUCTS — ABRASIVE WHEELS • STICKS, STONES AND RUBS • SPECIALTIES • SUPERFINISHING STONES • SPECIAL FORMS • ABRASIVE GRAINS AND FINISHING COMPOUNDS

FOR EVERY ABRASIVE APPLICATION
. . . CALL IN
CARBORUNDUM
TRADE MARK

MY!... BUT SUCCESS

(Portrait of a growing family)

If you study the picture above, you'll notice a certain family resemblance . . .

There's Awful Friendly, Plenty Friendly, Utterly Friendly and a flock of others whose names slip me now.

You see the American Mutual family has grown so rapidly in the last 4 years, even I'm amazed!

In this short period, we've practically *doubled* the amount of business we do! (And we were up among the leaders to begin with.)

I say this, not to brag . . . but to let you know that when you join the American Mutual family as a policyholder, you're signing up with one of the healthiest companies in America today!

Why did almost *twice* as many people come to us for protection recently? . . .

Because we offered them the chance to get *a dollar's worth of protection for 80 cents* in almost every case.

Because our special *I. E. Loss Control Service,** which we feel is the greatest extra in insurance, has demonstrated year

AMERICAN MUTUAL...the first American liability insurance company

© 1947 AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

CERTAINLY BREEDS!

by Mr. Friendly

after year that we can help businessmen reduce costly accidents, and increase plant efficiency and profit at the same time!

Because we've helped cut premium costs for hundreds of companies to way below the average for their field! (As much as 50% below average in some cases.)

The point is... we'd like to have you join our big Friendly family. We'd like to help you in every way.

And personally, I get a kick out of being head of a family with thousands and thousands of new members every year.

Beats quintuplets any day!

**Accident prevention based on principles of industrial engineering.*

MAIL THIS COUPON NOW

Dept. F-27, American Mutual Liability Insurance Company
142 Berkeley Street, Boston 16, Massachusetts

Without obligation, please *rush* me my *free* copy of *The All-American Plan*, showing me how to save as much as 20% on practically every kind of insurance, except life. Also, a most helpful, free, illustrated 98-page book, *Foremanship and Accident Prevention in Industry*.

Name _____

Street _____

City _____ *State* _____

RELIANCE V★S DRIVE

NOW . . . for *at a price*

The new V★S Drives are now available in ¼, 1, 1½ and 2 hp. sizes. Compact control unit is approximately 11" square, 30" high—weighs under 75 pounds.

The Original Packaged All-Electric, Adjustable-Speed Drive for A-c. Circuits

NEW V★S DRIVES (¾-2 hp.)

Thousands of Additional Applications

everybody can afford!

Adjustable Speeds from A-c. Power for Greater Production at Lower Cost!

Here is a simple, space-saving, low-cost *All-Electric* Adjustable-speed Drive. This V★S Drive utilizes the same fundamental principles employed in the design of *all* Reliance V★S Drives for over 11 years.

UNLIMITED SPEED CHANGES. Provides an unlimited selection of speeds over a wide range —*electrically.*

JOGGING AND CREEPING SPEEDS. Selector switch provides for slow, jogging speed. Creeping speeds available through speed adjustor.

REMOTE CONTROL. Push a button and twist a knob—at the machine or at any remote location —for *instant* action.

QUICK, SMOOTH STARTING AND STOPPING. Offers fully controlled starting and stopping. Dynamic braking is available.

SPACE-SAVING. Compact, adjustable-speed drive motor connected to the driven machine saves valuable production space.

SIMPLIFIED DESIGN. Simplest design ever achieved in a packaged, all-electric adjustable-speed drive operating from A-c. circuits.

ADAPTABLE. The new V★S Drive can be easily applied to existing machines or built into machines as original equipment.

Machine builder or machine user, it will pay you to have all the facts on this important extension of the V★S line. Write today for Bulletin D-2101.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

"Motor-Drive is More Than Power" • 1070 Ivanhoe Road, Cleveland 10, Ohio

Proved Performance

IBM's electronic control has proved to be a great advance in the development of time systems. Although announced only a short time ago, hundreds of IBM Time Systems with Electronic Self-regulation are already in service in industrial plants, hospitals, public buildings, schools, hotels, stores, and office buildings.

With electronics, self-regulated time indicating, time recording, and time signaling systems give unequalled performance—at low installation cost. No special clock or signal wiring is required. Operation and self-regulation are accomplished over regular AC lighting wires.

Investigate these flexible, economical time systems today. Call or write the local IBM office (or the address below) for information on this equipment and other IBM Electronic Business Machines.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION

World Headquarters Bldg., 590 Madison Ave., New York 22, N. Y.

Specify PLIOWELD

for permanent anti-corrosion protection

WHEREVER metal is used to store, process or transport corrosive chemicals — solutions of inorganic acids, salts and alkalis; metal plating solutions; organic materials — it can be *permanently protected* with PLIOWELD rubber lining.

Every PLIOWELD installation is especially formulated after careful analysis of the specific operation by the G.T.M.—Goodyear Technical Man. To consult him on *your* problems, get in touch with your nearest Goodyear Industrial Rubber Products Distributor, or write Goodyear, Akron 16, Ohio.

Plioweld—T.M. The Goodyear Tire & Rubber Company

TYPICAL USES OF PLIOWELD

Processing Tanks — *rectangular, round, square*
Tank Covers—*flat, box, radius types*
Storage Tanks—*open top, flat or dished heads*
Truck Tanks
Railroad Tank Cars
Fans—wheels and housings
Flanged Pipe
Flanged Pipe Fittings
Ductwork
Scrubbers—air purifiers
Agitators
Continuous Vacuum Filters
Troughs and Chutes
Pumps
Filter Frames
Moisture Eliminators
Miscellaneous Fabricated Items
Plioweld can also be used to combat abrasion

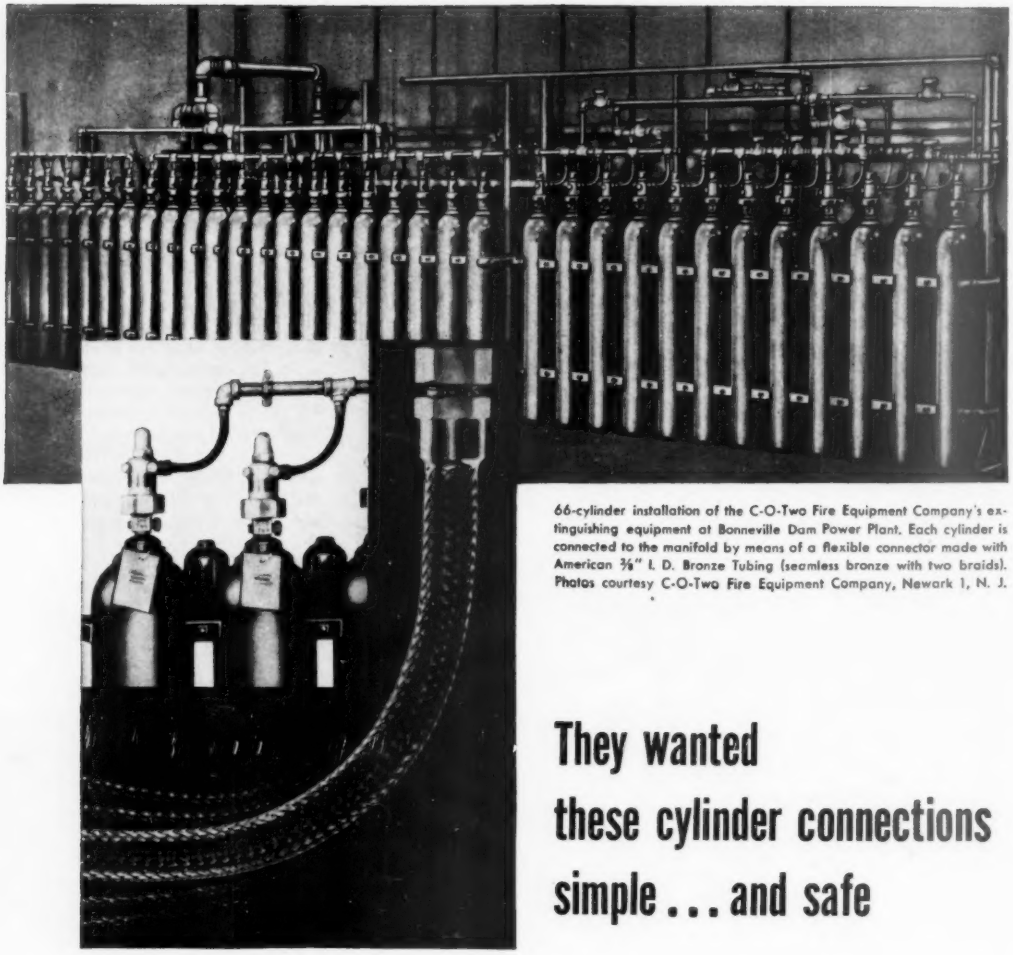
7 REASONS WHY THE G.T.M. SPECIFIES PLIOWELD

1. Effectively seals in corrosives that cannot be handled in metal
2. Bonds permanently to metal surfaces — an exclusive Goodyear process
3. Does not split or loosen with vibration or severe external impacts
4. Does not crack or buckle under alternate wetting and drying or under temperature changes
5. Surface will not disintegrate or slough off
6. Protects chemicals from discoloration, iron "pickup" and other contaminations
7. Each installation specially formulated to provide maximum protection against chemical handled

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER



66-cylinder installation of the C-O-Two Fire Equipment Company's extinguishing equipment at Bonneville Dam Power Plant. Each cylinder is connected to the manifold by means of a flexible connector made with American ⅜" I. D. Bronze Tubing (seamless bronze with two braids). Photos courtesy C-O-Two Fire Equipment Company, Newark 1, N. J.

They wanted these cylinder connections simple . . . and safe

So they used American Seamless Flexible Metal Tubing for the 66 manifold connectors in this installation. Couplings swing freely and accurately into line. No struggling with rigid or semi-rigid pipe or tube.

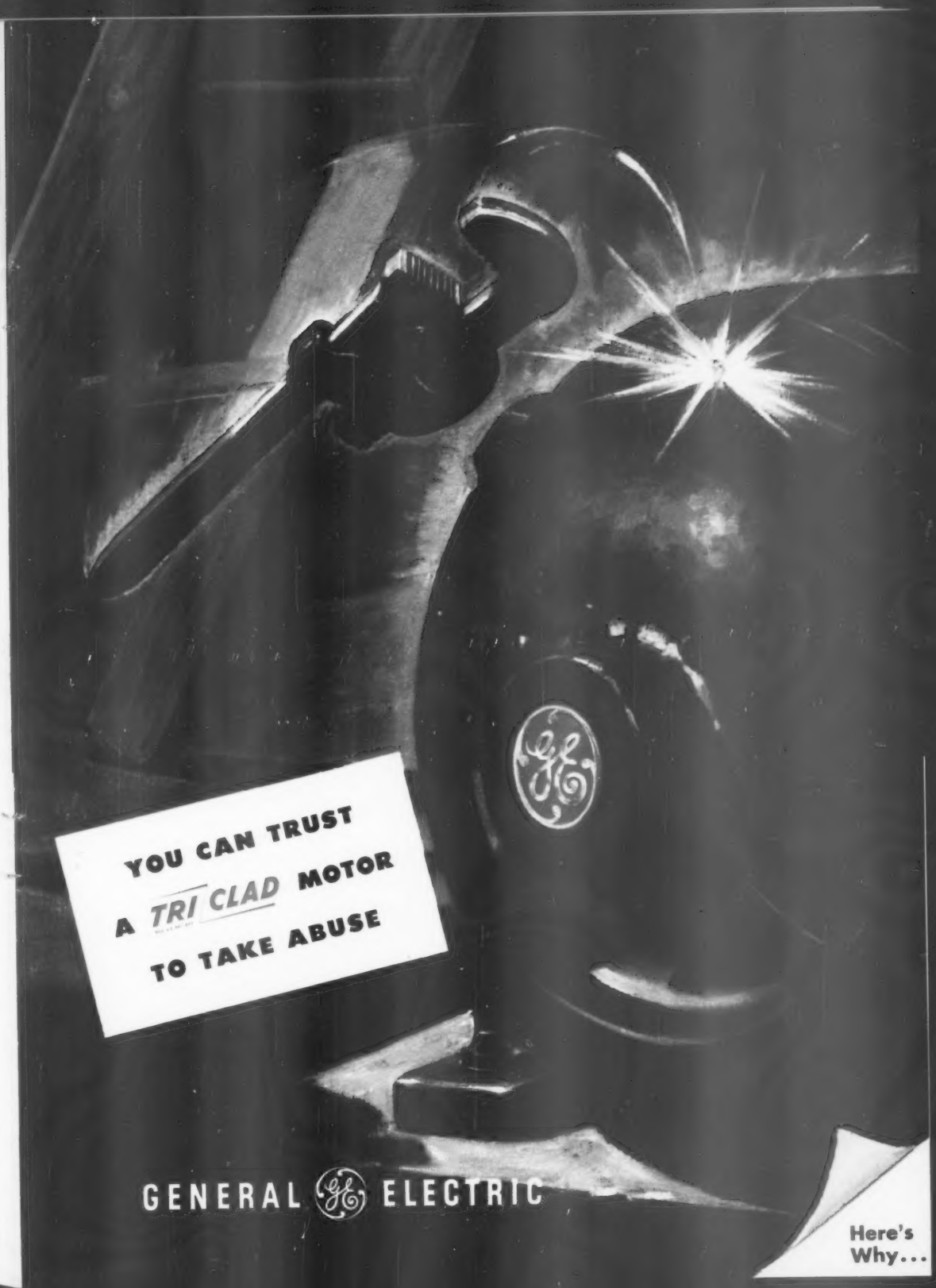
Resists corrosion, heat and cold; minimizes vibration. American Seamless Flexible Metal Tubing can be flexed thousands of times with no danger of failure—carries thousands of pounds pressure safely. For flexible metal hose or tubing designed for use with almost any gas, vapor, liquid, or even semi-solid, consult The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Company, Ltd.

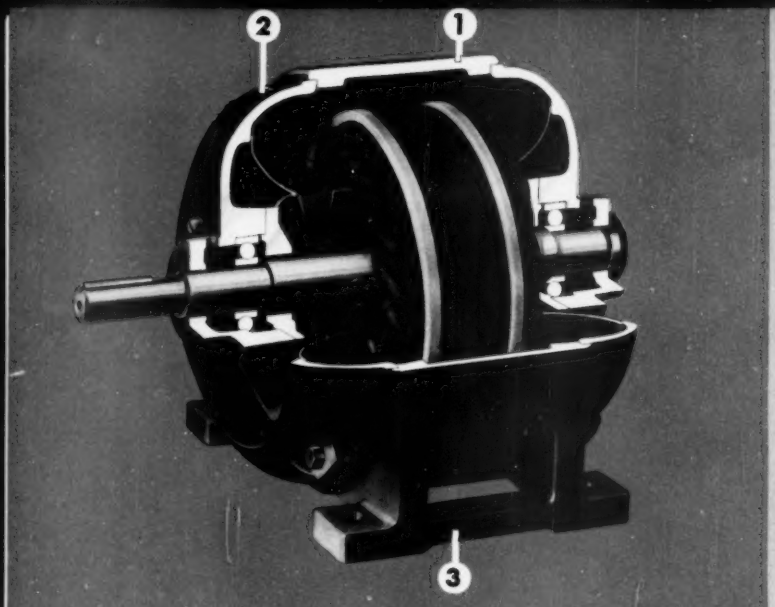
49296

ANACONDA
from mine to consumer

wherever connectors must move . . . American

FLEXIBLE METAL HOSE AND TUBING


YOU CAN TRUST
A TRI CLAD MOTOR
TO TAKE ABUSE
GENERAL ELECTRIC
Here's
Why...



Notice the thick cross sections of a Tri-Clad's husky cast-iron stator frame (1) and end shields (2) . . . the integrally cast feet (3). Here you have a *rigid structural unity* that no other general purpose motor we've seen can match. Distortion of bearing alignment is well nigh impossible, even by severe blows, careless installation, or the heavy continuous radial loads some industrial drives impose. Notice, too, how Tri-Clad double-end ventilation provides *uniform* "air conditioning" throughout the motor.

You can trust a *TRI CLAD* motor to take abuse

Teeth-rattling blows – accidental jarring – dripping liquids – they're all in a day's work for a Tri-Clad motor – the toughest general-purpose motor that hard-headed plant management can buy.

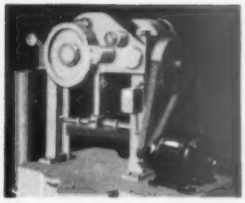
The cast iron structure which today protects more than a million and a half Tri-Clad motors, is one big reason for its stamina. It absorbs the shock of accidental blows and falling objects encountered in rigorous industrial service. It provides vastly superior resistance to rust and corrosion. Moreover, cast iron won't take on an injurious permanent "set"; thus it assures accurate shaft alignment and a permanent air-gap for the life of the motor. Thick-ribbed cast-iron end shields, too, take more than their share of punishment.

Want to standardize on a line of motors that can really **TAKE ABUSE?** Local stocks of Tri-Clad motors in your area mean **QUICK DELIVERY.** *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

700-11

YOU CAN'T BEAT *TRI CLAD* EXTRA PROTECTION



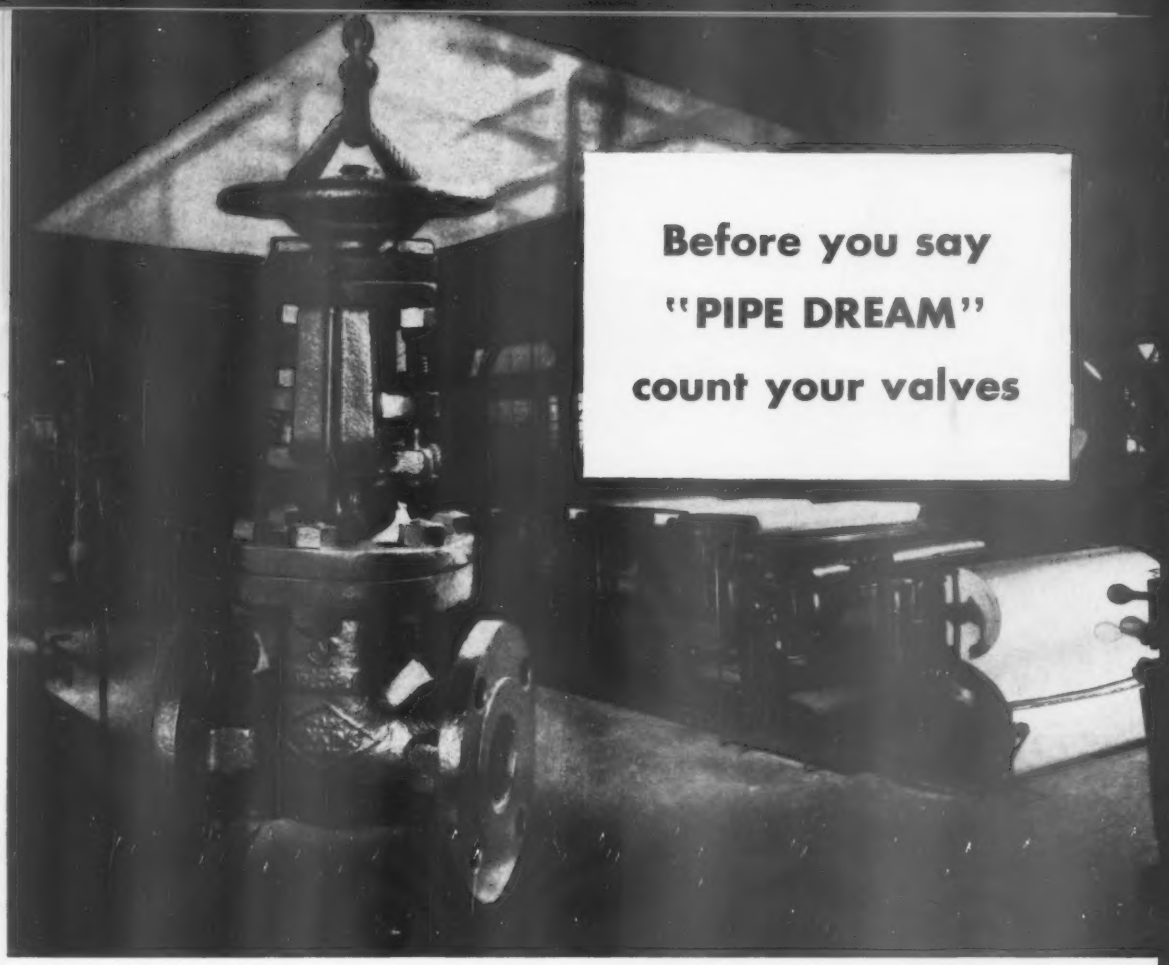
G-E open (drippproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.

G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.

G-E vertical induction motors for pump drive, in streamline design. From 1 to 500 hp.

G-E capacitor motors for use on fans, blowers, pumps and compressors, with single-phase power. From ⅛ to 5 hp.

Look for this **EXTRA** on the motor you buy!



IN THIS PAPER MILL, as in every plant where fluid control is necessary to operation, there's a valve that is only revealed, as here, by photo-magic. It's the giant you'd see if *all the valves* were *one valve*, and often it represents an investment greater than for large equipment units always chosen with a sharp eye on operating economy.

IT PAYS to keep this collective valve in mind, instead of thinking of valves individually as items of minor expense—for, with wages and material costs higher than ever, valve economy is essential.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by thousands, it becomes a serious drain on operating budgets.

JENKINS BROS. helps you meet this problem two ways. First, by building extra endurance into Jenkins Valves, making them the longest-lasting, lowest up-keep valves that money can buy. Second, with advice from Jenkins Engineers on proper selection, installation, or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering service for lowest valve costs in the long run. *Sold through leading Industrial Distributors everywhere.*

•

Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

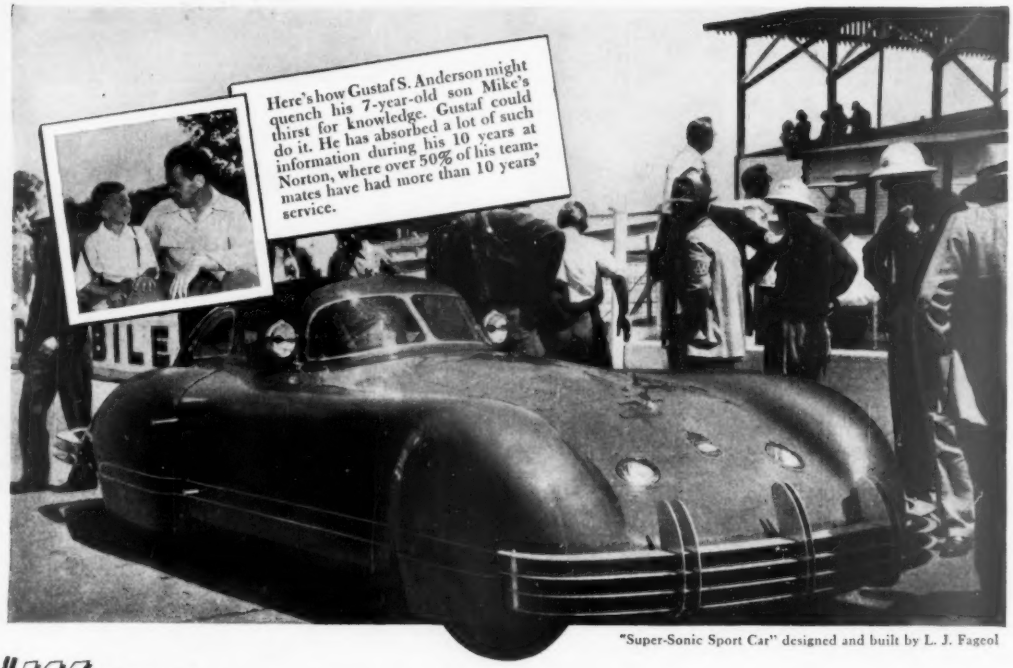
"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write: JENKINS BROS., 80 White St., New York 13, N. Y.

LOOK FOR THIS JENKINS DIAMOND MARK

SINCE Jenkins Bros 1864

JENKINS VALVES

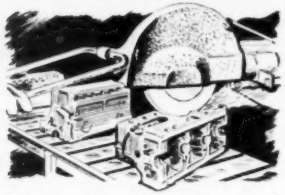
Types, Sizes, Pressures, Metals for Every Need


Here's how Gustaf S. Anderson might quench his 7-year-old son Mike's thirst for knowledge. Gustaf could do it. He has absorbed a lot of such information during his 10 years at Norton, where over 50% of his teammates have had more than 10 years' service.

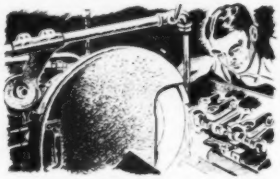
"Super-Sonic Sport Car" designed and built by L. J. Fageol

"WHAT WILL CARS BE LIKE WHEN I GROW UP, DAD?"

"Well, son, you can be sure *your* first car will pack more power, ride smoother and cost less to run than today's cars. The automobile makers know folks always want improvements, so they make better cars every year."



"Norton grinding wheels help — and they start on the first rough castings. Our hones make cylinder walls smooth and long-lasting. Dies and tools are manufactured and maintained with Norton grinding wheels.



"Camshafts must be true, or engines won't run smoothly. Norton Cam-O-Matic grinding machines finish cam contours to close precision. In fact, these speedy, automatic grinders help lower mass production costs.

"New cars look better every year. And their smoother surfaces for better paint jobs come from things like Behr-Manning abrasive discs. Behr-Manning, remember, is an important member of the Norton family."

"Of the thousands of parts that make up a modern car, nearly all of them are made better by the touch of products made by the Norton family. That also applies to just about every other industry, large or small. That's why I like my job of making better products to make other products better."

NORTON

TRADE MARK REG. U. S. PAT. OFF.

Making better products to make other products better

ABRASIVES — GRINDING WHEELS — OILSTONES — ABRASIVE PAPER & CLOTH

GRINDING AND LAPPING MACHINES — LABELING MACHINES — NON-SLIP FLOORING

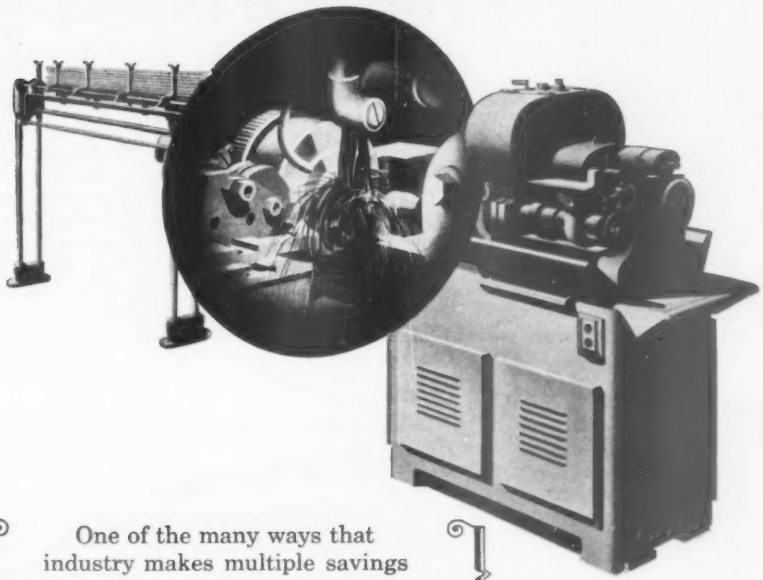
REFRACTORIES, POROUS MEDIUMS & LABORATORY WARE — NORBIDE PRODUCTS

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

BEHR-MANNING, TROY, N. Y. IS A DIVISION OF NORTON COMPANY

GULF CUT-AID

helps cut machining costs for aluminum and other non-ferrous metals— improves finish, tool life



One of the many ways that industry makes multiple savings with Gulf Quality Petroleum Products.

Economical machining of aluminum and other non-ferrous metals requires a cutting oil with special properties. It must have unusually good cooling and wetting characteristics, yet have better lubricating qualities than water or soluble oil emulsions.

Hundreds of machine shops have found that Gulf Cut-Aid is the ideal fluid for this type of machining job. This revolutionary cutting oil helps them get better finishes on the work, longer tool life, and greater production.

Here's a report, for example, from a New York firm who had a problem in drilling a hole 2 in. deep in brass bolts: "Competitive oils wouldn't penetrate into the hole during the drilling operation", says the Machine Shop Foreman. "As a result, tool life was unsatisfactory. Now with Gulf Cut-Aid we drill a thousand pieces before regrinding, an increase of more than 100%! Also because of the exceptional cooling qualities of Gulf Cut-Aid we have no difficulty in holding tolerances to specifications."

Gulf Cut-Aid is one of more than 400 Gulf quality oils and greases that are helping industry improve production and reduce costs. For effective assistance on every application of petroleum products in your plant, call in a Gulf Lubrication Engineer. Write, wire, or phone your nearest Gulf office.

Gulf makes available top quality passenger and truck tires — ask your Gulf representative

Gulf Oil Corporation · Gulf Refining Company

Offices in Principal Cities in 30 States

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

Studebaker
USES "J" TYPE SPEED NUTS
Saves 35% on Fender Assembly Cost

Right out of Studebaker's own cost estimate files comes this report of outstanding SPEED NUT savings.

To establish this saving factor, tests were made using 18 welding nuts to fasten the rear fenders to the body. Then, for comparison, 18 "J" Type SPEED NUTS were used to perform the same operation. The resulting statistics reveal that SPEED NUTS *provide a 35% savings in material and assembly costs on this application.*

This is one reason why there are hundreds of SPEED NUT brand fasteners of various types used in the assembly of the 1950 Studebaker.

Here, too, is sufficient reason why you should investigate the SPEED NUT way to lower assembly costs and improved product quality. Ask your Tinnerman "Fastening Specialist" for information on the comprehensive Fastening Analysis Service . . . and write for your free copy of SPEED NUT Savings Stories. TINNERMAN PRODUCTS, INC., 2040 Fulton Road, Cleveland 13, Ohio. In Canada: Dominion Fasteners, Ltd., Hamilton.

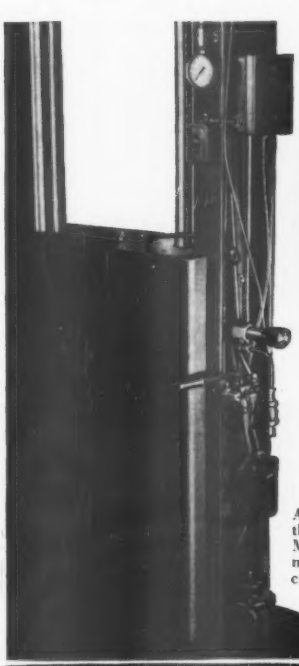
"The Next Look in Cars"—
The 1950 Studebaker Land Cruiser
Thumb pressure snaps "J" Type SPEED NUT over edge of wheel house panel, in position for blind location assembly. Provides secure, vibration-proof attachment on Acme bolt.
TINNERMAN
Speed Nuts

KRW ANNOUNCES

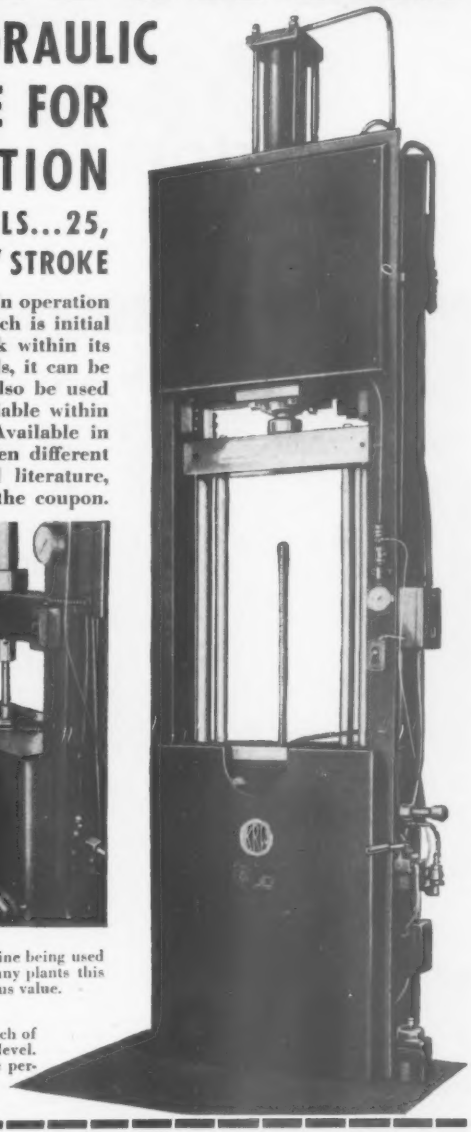
A NEW, LOW-COST HYDRAULIC BROACHING MACHINE FOR "PUSH-PULL" OPERATION

VERTICAL OR HORIZONTAL MODELS...25, 50, 60-TON CAPACITIES, UP TO 48" STROKE

You have to see this new KRW Broaching Machine in operation to appreciate its many features not the least of which is initial cost. This broaching machine will handle any work within its stroke and working capacity. In a matter of seconds, it can be changed from "Push" to "Pull" operation. It can also be used as a press. Pressures and stroke are infinitely variable within rated capacity. Electrical controls are standard. Available in either vertical or horizontal models. Choice of Ten different hydraulic pump combinations. Write for detailed literature, specifications and prices of standard models. Use the coupon.



The KRW Broaching Machine being used as a hydraulic press. In many plants this feature is a definite plus value.



All controls within convenient reach of the operator. Pressure gauge at eye level. Manually operated four-way valve permits instant and precise finger-tip control of ram. Every control readily accessible.

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send information on KRW Hydraulic Broaching Machine. Capacity Req. 25 Ton ☐ 50 Ton ☐ 60 Ton ☐

Name_____

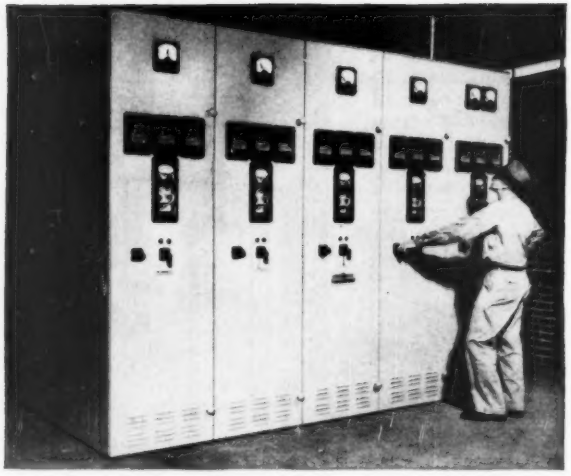
Address_____

City & Zone_____ State_____

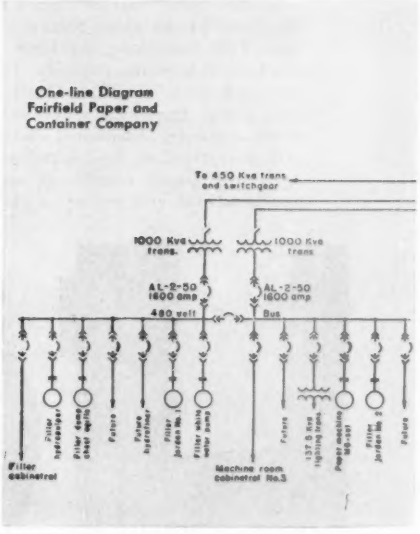
81

FAIRFIELD
PAPER AND CONTAINER CO. chooses a

METAL-CLAD
for



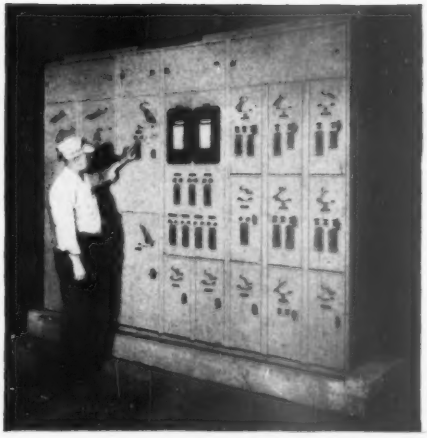
General Electric 5-kv Type MI-6 metal-clad switchgear consisting of one incoming-line breaker and four feeder breakers to handle 4160 volts at Fairfield Paper and Container Co. Magne-blast air circuit breakers are rated 1200 amperes, 100,000 kva interrupting rating. Note neat appearance of metal-clad unit. It's space saving too, and the metal-clad construction offers operating safety to personnel. Units like this are easily installed and can be added to with a minimum of bother and expense. Instruments and relays are co-ordinated for positive protection of circuits.



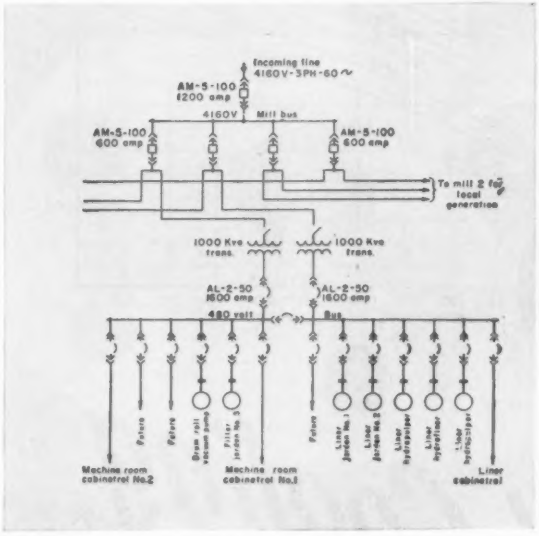
G-E Cabinetrol units provide centralized control for the liner stock system. Unit controls motors, valves, agitators, etc. Ammeters record load carried by hydrapulper and hydrafiner. Four other Cabinetrol units are used throughout the mill.

The Fairfield installation is a complete General Electric project—one source of responsibility plus the very best in co-ordinated planning, engineering, manufacturing, and servicing facilities to give maximum savings and efficiency to the customer.

Two G-E low-voltage metal-enclosed switchgear equipments take the 480-volt power from the 1000-kva transformers and distribute it to motors, lighting transformers, and five Cabinetrol units. The Type AL-2 transformer secondary breakers and tie breakers are rated 1600 amperes, 50,000 amperes interrupting rating. Type AK-1 drawout air circuit breakers of 25,000 ampere interrupting rating are used to feed motors and Cabinetrol. Breakers for future circuits can be installed in spare compartments. G-E air circuit breakers have adequate "IC" (Interrupting Capacity) for short circuit protection, are easily removed for inspection.



secondary-selective system using SWITCHGEAR continuity of service



At the new Fairfield Paper and Container Co. installation General Electric metal-clad switchgear receives the incoming 4160-volt power and distributes it to 4-1000 kva transformers for step-down to 480 volts. G-E metal-enclosed switchgear handles the 480-volt power through air circuit breakers of the drawout type. In general, all motors rated 60 hp and above are served by an individual breaker. Five Cabinetrol units are fed by air circuit breakers. Note that costly secondary feeders are short.

This secondary-selective system is only slightly higher in cost than a simple radial system, and provides Fairfield insurance against a complete shutdown in case of failure of any one transformer or its primary feeder cable. If trouble occurs the normally-open tie breaker is closed, thus providing an alternate source of power which permits the mill to operate at slightly reduced capacity.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

here's why...

"When we planned our new facilities it was decided that a secondary-selective power distribution system would assure us of the continuous power, even in case of a major fault, needed for continuous-process operations like ours. We ordered G-E switchgear because their "metal-clad" protection safeguarded our employees, and because we could get all engineering, equipment and service from one organization. By dealing with one company we saved considerable time and money. The units arrived complete and we installed them in very little time."

H. L. CUSTER, VICE PRESIDENT AND GENERAL MANAGER, THE FAIRFIELD PAPER AND CONTAINER CO., BALTIMORE, OHIO

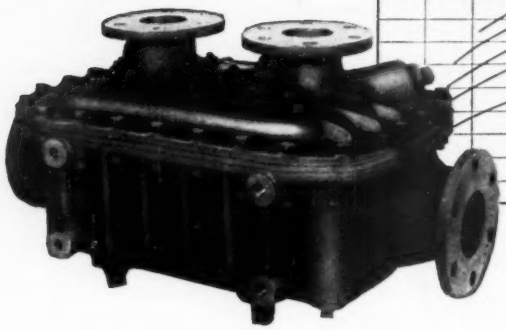
MODERN INDUSTRIAL power distribution systems using G-E switchgear are applicable to any industrial plant or commercial building where you want proper voltage for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs. A complete system, using G-E switchgear, costs you less than a "piece-meal," makeshift affair.

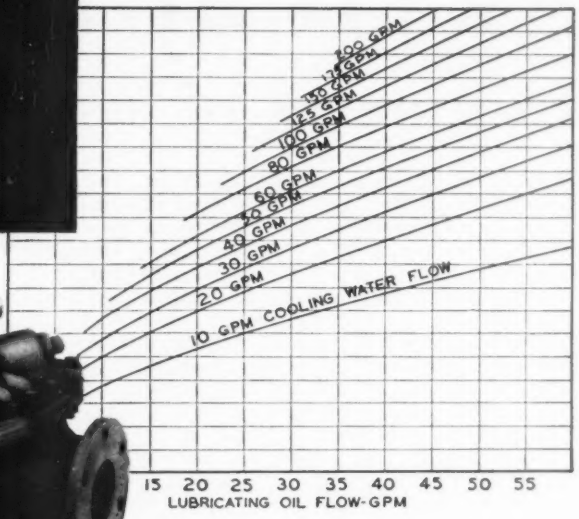
INVESTIGATE TODAY the many advantages of using General Electric switchgear in *your* plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—or write for the helpful bulletins listed below. *Apparatus Department, General Electric Co., Schenectady 5, New York.*

GEA-3083	Metal-clad Switchgear
GEA-4966	Low-voltage Metal-enclosed Switchgear
GEA-3592	Load-center Unit Substations
GEA-3758	Load-center Power Distribution
GEA-4057	Interlocked-armor Cable for Primary Circuits
GEA-4352	Flamenol Cable for Secondary Circuits

GENERAL ELECTRIC

HARRISON OIL COOLERS





CUT COSTS WITH

Controlled Cooling

Make machine tools more efficient. Let Harrison analyze your cooling problem on cutting oil, lube oil, hydraulic fluid. Complete testing laboratories assure the *right* Harrison product to meet your needs.

HARRISON

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

"A BOLT IS ONLY HALF A FASTENER WITHOUT A NUT!"

FOR A *Complete* QUALITY "FASTENER TEAM"
USE LAMSON NUTS!

It takes *two* to complete a "fastener team"... a bolt and a nut. Quality bolts *deserve* the plus values found in Lamson nuts ... the accurate fit and dependable holding power.

Lamson makes many different types of nuts in hundreds of shapes, styles and sizes ... a nut for almost every purpose.

Whether you need standards or specials, in plain, plated or stainless steel—in brass, bronze or aluminum, Lamson makes them all.

Think of Lamson nuts when you buy bolts ... and buy *both!*

THE LAMSON & SESSIONS COMPANY

General Offices: 1971 West 85th Street, Cleveland 2, Ohio

Plants at Cleveland and Kent, Ohio • Chicago • Birmingham

Lamson & Sessions

"One Dependable Source for All Fastener Needs"

SEMS	LOCK NUTS	NUTS	STUDS
STOVE BOLTS	LAG BOLTS	WASHERS	RIVETS
TAPPING SCREWS	ROPE CLIPS	SET SCREWS	PLOW BOLTS
"1035" CAP SCREWS	MACHINE BOLTS	CARRIAGE BOLTS	COTTER PINS

WANT MORE INFORMATION on any of these fasteners? *CHECK*—and *CLIP* this strip.

LAMSON LOCK NUTS: Economical, vibration-proof. Can be re-used repeatedly.

SEMS: Tapping and Machine Screws with Lockwashers attached.

COTTER PINS: Steel, Brass, Aluminum and Stainless Steel.

"BENT" BOLTS: Including U Bolts, Eye Bolts, Hook Bolts, etc.

LOK-THREAD STUDS: Thread locks and seals in standard tapped holes.

Wire Rope Clips: Hi-Center saddles, extra-strength U Bolts.

PLASTIC INSERTS: To your specifications ... in production quantities.

AIRCRAFT FASTENERS: AN Bolts, Nuts, Screws, Studs and Cotters.

"1035" CAP SCREWS: Hi-Tensile heat-treated steel.

The Lamson & Sessions Company
1971 W. 85th St., Cleveland 2, Ohio

NAME

POSITION

COMPANY

STREET

CITY ZONE STATE

CUT ALONG THIS LINE

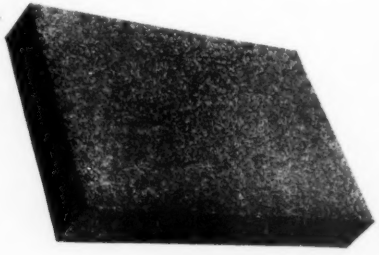
In the Nation's Capitol—$5,000,000 for renovation . . .

PC FOAMGLAS

This photograph shows the location of the two roofs which were replaced, and in which PC Foamglas Insulation has been installed.
General Contractors: Consolidated Engineering Co., Inc., Washington, D. C.

The two wings of the Capitol at Washington, which contain the Chambers of the House of Representatives and the United States Senate, are being re-roofed and redecorated at a cost of about $5,000,000.

An important addition to the new roofs is insulation, which must meet exceptionally exacting requirements. The material selected is PC Foamglas, the permanent insulation, which has met similar requirements successfully for years on all sorts of buildings.



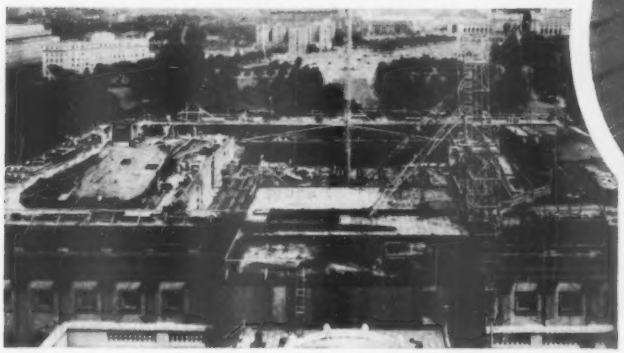
ARCHITECTS, engineers and insulating specialists have come to rely on PC Foamglas to solve their most pressing insulating problems. They have found that the unique properties of Foamglas make it the ideal insulating material for roofs, walls, floors and ceilings of all kinds of structures, from small dwellings to monumental public buildings.

WHAT IS FOAMGLAS?

Foamglas is the only material of its kind, different from the wools, boards and batts, the various fibrous and granular insulating materials with which you are already familiar. It contains no organic matter.

To make Foamglas, a very special kind of glass is subjected to a controlled heating process which produces strong, rigid blocks, composed of millions of tiny closed glass bubbles, full of still air. Because it is made of glass and because of its cellular structure, Foamglas is an exceptionally effective insulating material.

FOR INSULATION



Center section of the old roof has been removed from the Senate Chamber at this point. Later both end sections were also removed and the new roof, containing PC Foamglas insulation was installed. Roofing Contractor: Lloyd E. Mitchell, Inc., Baltimore, Md.

Here you see PC Foamglas being laid on a sloping section of roof deck. The big lightweight blocks are easily handled, lay up quickly, form a firm level base for roofing felts. Foamglas can be cut to fit around pipes and other obstructions right on the job with ordinary tools. Later, roofing felts were applied, and the entire job was finished with a metal roofing material by The Fingles Co., Baltimore, Md.

LIGHT - RIGID - STRONG

Husky big blocks of Foamglas are so light that the large expanses of roofs in which they are used as insulation need no extra structural reinforcement . . . so rigid that they readily support their own weight, become an integral part of the structure, when built into walls . . . so strong that they safely support more than ordinary loads when used to insulate floors, platforms, ramps, etc. in all sorts of structures.

FIREPROOF - MOISTUREPROOF - VERMINPROOF

There is no food for flames in Foamglas, for glass will not burn. Its continuous cellular structure does not permit moisture to penetrate or pass through Foamglas. Vermin cannot eat into or through it, nor can they nest or breed in Foamglas Insulation. Foamglas is also vaporproof, fumeproof and acidproof. It withstands high humidity, minimizes condensation.

At this stage of construction, temporary girders are being removed from the House Chamber, making way for the new steel-supported concrete roof deck on which PC Foamglas is used as insulation. Roofing Contractor: Warren Ehret Co., Washington, D. C.

FIRST COST IS LAST COST

You need fear no costly repairs, maintenance or replacements when you insulate with PC Foamglas. Being glass, Foamglas is impervious to many elements that cause other materials to lose insulating efficiency. In fact, when installed according to our specifications and recommendations, PC Foamglas retains its original insulating efficiency *permanently*.

Its ability to retard heat travel, to reduce condensation, to withstand humidity, make Foamglas an exceptionally effective insulation. Freedom from repairs, maintenance and replacement make PC Foamglas an exceptionally economical insulating material.

SEND IN THE COUPON

Send for a sample of Foamglas. Test its light weight. Step on it. Cut it. Send the convenient coupon for our detailed, authoritative booklets. Consult our insulating specialists. They can show you where you can use PC Foamglas to the best advantage, on all types of industrial, commercial and public buildings.

Pittsburgh Corning Corporation
Dept. H-129, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me without obligation a sample of PC Foamglas and your FREE booklets on the use of PC Foamglas Insulation as checked below:

Normal Temperature: Roofs ☐ Walls ☐ Floors ☐
Refrigerated Structures: ☐ Home Insulation ☐

Name_____

Address_____

City_____ State_____

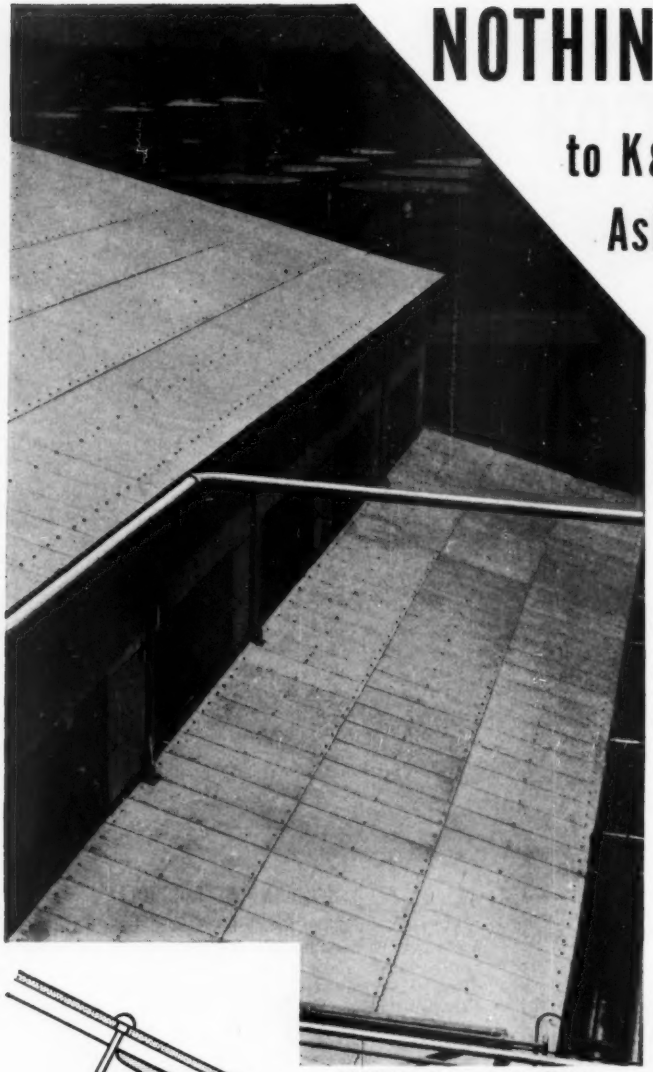
PITTSBURGH PC CORNING

FOAMGLAS INSULATION

. . . when you insulate with FOAMGLAS . . . you insulate for good!

NOTHING HAPPENS

to K&M *"Century"* Asbestos Corrugated



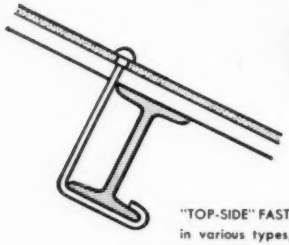
Here you see it used for both the roofing and siding on this Shell Oil Company building at Deer Park, Texas. Don't ever expect to see it hurt by the weather or other adverse atmospheric conditions. Count on it to go rustless and rotless. It won't suffer from rodents and termites, and is exceptionally resistant to fire.

Easily cut and fitted on the job, K&M "Century" Asbestos Corrugated produces tight, good-looking surfaces at minimum labor cost. For extra savings use "TOP-SIDE"* fasteners, as on this Shell building. They entirely eliminate scaffolding and are only available with K&M "Century" Asbestos Corrugated.

Your finished job will benefit by the inherent structural strength of this material which actually gains strength with age. As for upkeep, you needn't figure on even one bit of paint!

*® H. & B. Enterprise Corp.

ERECTORS: Lummus Co., New York City.



"TOP-SIDE" FASTENERS are made in various types, to fit all steel members on both roofing and siding. Illustration of typical "J" type for roofing.

Nature made Asbestos...
Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

Thermoid Impregnation Process Assures Longer Hose Life

In every branch of industry . . . in mines . . . in the oil fields . . . in foundries, food plants and factories . . . everywhere quality hose is required, you can confidently specify Thermoid. *Thermoid makes a complete line of quality hose for every industrial use.*

If you use hose for handling air, water, steam or oil . . . there is a Thermoid hose *"built for the job"* . . . each designed for highest operating efficiency.

For quick service call the nearest Thermoid distributor. Thermoid sales engineers are available for advice on special problems.

It will pay you to *Specify* Thermoid!

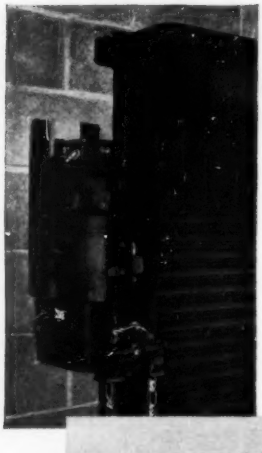
Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

The Thermoid Impregnation Process insures a deeper penetration of rubber between the threads of the yarn, which encases each individual strand with protective rubber. The rubber acts as a sheath between the strands and prevents the destructive abrasive action as the product is flexed in use. To obtain the required rubber penetration, the twist of the yarn must be to exact specifications. With the yarn twisted too tightly, proper penetration of the rubber compound is impossible. This condition produces abrasion, causing premature failure. On the other hand, if the yarn is twisted too loosely, the product lacks tensile strength. Thermoid has discovered the optimum twist of the yarn which assures maximum rubber penetration and greatest strength. The development of Thermoid Impregnation Process is another step forward in Thermoid's planned program of product improvement, assuring maximum service and lower operating costs to industry through the use of Thermoid Industrial Rubber Products.

Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U.S.A.
Industrial Rubber Products • Friction Materials • Oil Field Products

Rolling Steel DOORS



MAHON STD. POWER OPERATORS

Manually • Mechanically • Power Operated

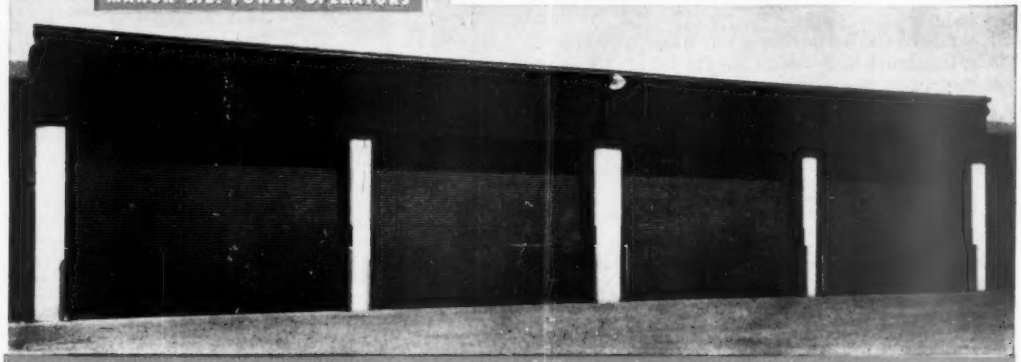
Rolling Steel Doors are today being selected for more openings in a broader variety of building types than ever before. Why? . . . the answer is simple. The permanence of all steel construction means a lifetime of trouble-free service . . . smooth, rapid vertical action requires a minimum of space adjacent to and above the opening. In Mahon Rolling Steel Doors you get the latest developments in doors of this type . . . more compact and more practical operating devices, curtains made up of interlocking slats of Stainless Steel, Aluminum, or tight-coated Galvanized Steel scientifically cleaned, phosphated, and coated with high temperature oven baked rust inhibiting enamel prior to roll-forming. These, and many other desirable features that characterize Mahon Rolling Steel Doors merit your consideration. See Sweet's for complete information or write for Catalog No. G-49.

THE R. C. MAHON COMPANY

Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Representatives in All Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Underwriters' Labeled Rolling Steel Doors and Fire Shutters; Insulated Steel Walls; Steel Deck for Roofs, Partitions, Walls, Acoustical Ceilings, and Permanent Concrete Floor Forms.

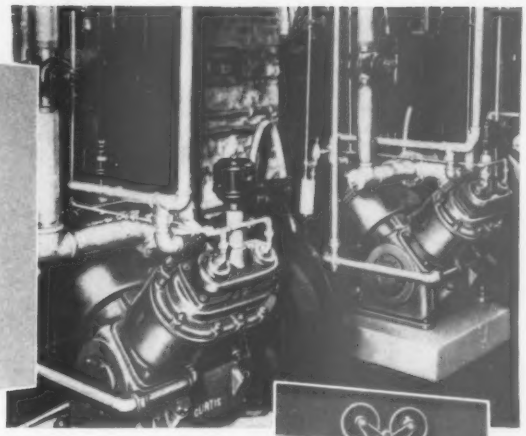


ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Mahon Power Operated Rolling Steel Doors recently installed in four double truck openings in a shipping entrance at American Metal Products Company's plant, Detroit, Michigan.

MAHON

Reduce Production Costs with CURTIS AIR COMPRESSORS, AIR HOISTS AND AIR CYLINDERS



Plant after plant is turning to Curtis Air Hoists and Cylinders for pushing, pulling, lowering or lifting operations . . . and to multiple installations of Curtis Air Compressors, which eliminate long air lines, the possibility of air leaks, and losses resulting from breakdowns of central air compressor installations.

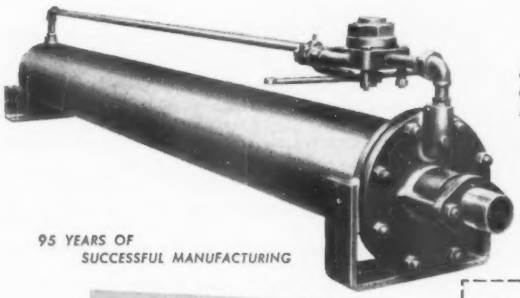
Here's why it will pay you to consider CURTIS *equipment*

AIR HOISTS AND AIR CYLINDERS

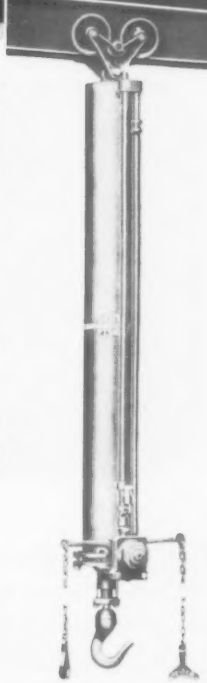
- Cannot be overloaded.
- Hoisting or lowering speed is controlled by operator.
- Ground-steel cylinder.
- Disc type valves.
- Valve automatically returns to vertical position when released.
- Can be operated by unskilled labor.

AIR COMPRESSORS

- Timken-Bearing equipped—permits external adjustment.
- Self oiling—positive lubrication.
- Precision construction throughout.
- Complete valve assembly removed or replaced in a few moments.
- Cylinder, crankcase, also heads made from gas-tight iron.
- Fully enclosed.



Curtis bracketed-type Air-Hoist Cylinder can be placed in any position from horizontal to vertical.



Curtis Pendant Air Hoist can be used for practically any lifting problem where the head room is not limited.

95 YEARS OF SUCCESSFUL MANUFACTURING

CURTIS

PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1995 Kienlen Avenue, Saint Louis 20, Missouri

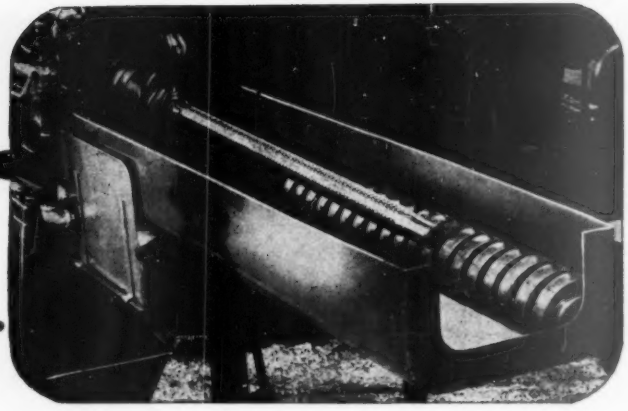
Curtis Pneumatic Machinery Division of Curtis Mfg. Co. 149-4
1995 Kienlen Avenue, St. Louis 20, Missouri

I am interested only in items checked below:

- ☐ Air Hoists
- ☐ Air Cylinders
- ☐ Air Compressors

NAME_____
FIRM_____
STREET_____
CITY_____ ZONE____ STATE_____

LOWER UNIT COSTS WHATEVER YOU MAKE...



...WITH TEXACO PRODUCTS AND LUBRICATION ENGINEERING SERVICE

PLANTS using Texaco Lubricants and Engineering Service report: fewer machine repairs and overhauls...fewer parts replacements...longer tool life...better finish and fewer rejects...cleaner plant ...increased production...lower maintenance costs.

They all add up to: *lower unit costs.*

That's why Texaco is so widely preferred. For instance, in mining—*More copper mining equipment in the U. S. is lubricated with Texaco than with any other brand.*

Assure these benefits for *your* plant, wherever located. A Texaco Lubrication Engineer will gladly work with your production men. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 E. 42nd St., N. Y. 17, N. Y.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

TEXACO STAR THEATRE presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

Look for tougher bargaining from regular CIO unions in their tug-of-war with the left wing. In the words of the *CIO News*: *"Don't let that 'right-wing' tag fool you."*

CIO's fight on its left wing is just beginning to pinch electrical manufacturers. The feuding will soon spread to other industries with leftish unions. CIO's right figures it must show it can be just as tough as —or maybe even tougher than—the left.

Big hunks of the expelled UE will be taken over by the new CIO electrical union. Bargaining rights won't be cleared up for months. Courts will take longer to straighten out control of union assets.

•

NLRB faces new questions. One of them: *Does a contract stay in effect after a new union takes over?* (A Board official thinks it does.)

Another: *Should elections at multi-plant companies be plant-by-plant?* That's what Westinghouse wants. *Or company-wide?* That's what CIO wants.

How NLRB decides No. 2 can tip the balance. Plant-by-plant polls would give the left-wing UE a foothold in some Westinghouse and General Electric plants. CIO can run off with company-wide elections.

•

Walter Reuther's auto workers will pick up the pieces of the farm equipment union. This union also got the boot from CIO after a quick merger with UE.

Ten other unions are on their way out of CIO. This will come after the formality of hearings before trial committees stacked with anti-Communists.

In the end, Communist-led unions will be out in the open, isolated. Relentless attack from CIO and AFL unions and the independent Machinists will reduce them to a hard core.

It will be natural for these unions to band together for self-preservation. They will make some trouble. But their influence in the American labor movement will be nil in the foreseeable future.

•

Practically all employers with a UE contract will be before NLRB next year. Under Taft-Hartley, employers may take the initiative as Westinghouse did. A helpful guide: Silverberg's "How to Take a Case Before NLRB." (Bureau of National Affairs, 292 pp., $5.)

Outlook for 1950 is good. Most contracts just signed run for two years. Wage reopenings can cause strikes, but they come at end of year. Only big threat will be at General Motors, June 1.

Reuther can upset the applecart at GM if he insists on the Bethlehem pension plan won by Philip Murray for steel workers. This plan bettered what Reuther got from Ford and what GM probably wants.

•

How to keep a pension when you change bosses? *That's what labor's pension experts are working on now that the pension idea is buttoned up.*

Three plans being suggested:

1. City-wide coverage for members of one union. (CIO's auto workers are pushing this in Toledo.)

2. Industry or craft coverage, like the electrical contractors have with AFL electricians.

3. A plan with a "vesting" provision giving workers the right to take pensions credit with them when they move from job to job.

•

More union leaders are getting elected to Congress.

Labor's latest contribution: John F. Shelley of San Francisco. Shelley, head of California's AFL, joins three other AFL officials in the House.

First from CIO: Rep. Thomas H. Burke. He left Toledo CIO job last year. Now he runs a House committee probing labor problems. (On his committee: Rep. Roy W. Wier, former secretary of Minneapolis AFL.)

Cleveland's Mayor Burke looms as the strongest foe labor and the Democrats can find for Taft. Gov. Lausche won't run. Taft's chances, always good, improve with the new Ohio ballot. Ballots must be marked for each office. No straight-ticket voting.

•

Taft-Hartley's 80-day crisis injunction is constitutional. So says the Supreme Court in refusing to upset contempt fines of $20,000 against John L. Lewis and $1,400,000 against his United Mine Workers.

Did the government violate railroad workers' rights when it got the railroad strike injunction last year? The Supreme Court refuses to say. Reason? The dispute was settled, so the issue is moot.

•

Supreme Court on veterans' rights: *Seniority credit given for time spent in service can't be taken away even after a year has elapsed.*

Lobbying expenses reported by labor unions during first session of Congress: $208,399.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Business promises to run on a high level through at least the first half of 1950.

Retail sales prospects are an important key to the general business outlook. And retail prospects in the months ahead are strong. Demand for automobiles has held high this fall, postponing the possibility of price cuts. Ford and Pontiac led the parade in introducing new models with no change in prices. Next year the industry expects that the huge replacement market for prewar and early postwar cars plus new models will keep it going at close to '49 level.

Makers of major appliances—refrigerators, washers, vacuum cleaners, television, and others—saw demand hit new peaks this fall. They look forward to another good year in 1950.

With homebuilding likely to dip only slightly from its 1949 peak, the 1950 outlook for the whole range of products that go into the home is strong.

•

Basic economic factors add strength to the first-half outlook.

The government will actually be running a sharp deficit in the first half, paying out more than it takes in. That reverses the picture of earlier postwar years when March 15 income tax payments drained off purchasing power and slowed up all business. Veterans will have a $2.8 billion World War II insurance dividend "windfall" to put into furniture, appliances, or new cars. That strengthens the market for durable goods. Incomes and employment promise to run as high as or higher than a year ago.

•

This year saw the wage-price spiral broken. And that will help business.

Wage increases in 1949 were slower to come, smaller, and more widely scattered than in '46, '47, and '48. The auto and steel industries settled for pension and insurance plans, most of which won't go into effect until next spring. In short, the fourth round was mild compared with the first three rounds. Its impact was not the same everywhere. And it was not followed by across-the-board price increases.

Rising productivity, declining prices for raw materials, and high-volume production after recovery from the spring "inventory slump" have all helped business this year. These trends promise to continue into 1950.

•

Declining prices will contribute importantly to a fall in dollar volume of U.S. exports next year.

Over-all exports are expected to drop as much as $2 billion—from about $17 billion this year to $15 billion next year. But overseas sales of machinery and industrial equipment may well hit new highs. Prospects are that exports of relief goods—food, coal, and other products that Europe normally can produce for itself—will drop sharply in 1950. Since Europe will have almost as many dollars to buy U.S. products as it had this year, that will release funds to buy the machinery and other industrial equipment still badly needed by the Marshall Plan countries.

Europe, however, will still have a dollar gap. And European customers will still want to buy more American products than they will have the dollars to pay for. The Marshall Plan, even with the cuts expected in the second half of the year, will cover most of the dollar gap. But you can't expect European nations to drop more than a small part of their restrictions on dollar buying. Other areas—notably Latin America—will also feel the squeeze on dollars. As a result, they are likely to try to buy less from the U.S., more from Europe.

•

Declining prices also bear heavily on the prospects for imports in 1950.

Imports are not likely to flood the American market. In fact, the dollar volume of imports is more likely to fall slightly—because of lower prices—than it is to rise.

Europe will be pushing sales of its consumer goods here. Holland, Italy, Britain, and other countries are expected to promote their products vigorously. But Europe's productive capacity is limited. Scotch whiskey, fine textiles, pottery—and other famed Europeans products—are generally short. The outlook is only for a slight expansion in sales.

Imports of basic commodities—tin, lead, newsprint, and such—are geared to American industry's sales volume. With no great expansion of business in sight here, imports of raw materials are not likely to increase much, certainly not enough to offset the declines in price that are expected. Whatever price advantage devaluation gave foreign producers has been largely lost because (1) they raised their dollar prices to bring in about the same dollar return, or (2) American domestic prices are on the downgrade.

•

To add all this up: *The prospects for foreign trade next year are good. You can look for a high level of activity. But there will be heavy pressure on prices. And some basic shifts in the pattern of goods flowing in and out are likely.*

FACTORY
MANAGEMENT AND MAINTENANCE

L. C. MORROW and HARRY LEE WADDELL, Editors

America's Business Challenge

A Study of History—10 Years From Now

HAVE A FEW MINUTES for a look at history? Future history, that is. It's a way to point up the great challenge facing American business—the need for a fuller flow of risk capital. Let's say this is an excerpt from the transcript of a hearing before what might be the Woonsocket Regional Commission of the Rhode Island Industrial Building Authority. The date is Dec. 4, 1959.

GEORGE SHYCAPITAL But my new radiation-resistant conveyor is well on the way to success already. I have more orders on hand than my little plant can fill in two months. I must have more space.

COMMISSIONER REAUCRAT Yes, yes. Our experts confirm your statements about your orders. But they also report that total sales of radiation-resistant conveyors in the last three years have been only—

SHYCAPITAL So what? The new atomic power plants are just beginning to open up the market. In a thing like this, you have to look to the future.

COMMISSIONER But the Industrial Building Authority *must* look toward the past. After all, we are really fiduciary agents. We must protect the integrity of our bonds. The public holds us responsible for their savings.

SHYCAPITAL You mean you're afraid to stick your political necks out. You're afraid—

COMMISSIONER Not afraid, Mr. Shycapital—prudent. We must therefore deny your application. Hearing adjourned.

Fantastic? Not if something comes of an idea now attracting serious attention in New England. Here it is:

A Rhode Island industrialist proposed this fall that the state government form an industrial building authority. The authority would issue tax-exempt bonds; they would be outside the state's official debt structure, but their interest probably would be guaranteed by the state (to assure tax exemption). The authority would take the money it got from selling bonds and invest it in new industrial plants. It would then lease these plants to manufacturing companies.

The plan sprang from Royal Little, of Textron Incorporated, Providence. Already it has bounded across state lines. You hear it argued pro and con in factory offices, banks, and businessmen's clubs in Hartford and Boston and Worcester.

"Straight down the road to socialism," many businessmen say.

And, of course, it's a powerful point. If a state authority owns a plant, you can be sure that at some critical time it will be sticking its nose into the management. And isn't the authority likely to be running the plant itself if the

company should slip on a competitive banana peel? Nice lot of political jobs to fill then.

But there's a catch to this "socialism" argument: *The word doesn't frighten a lot of people—including quite a few businessmen—any more.*

"Who cares what it's called, so long as it works?" such people ask.

That's a powerful point, too. If the plan should provide a clear channel to get savings flowing into risk investments, then it might be the very thing our economy needs to keep it too healthy to fall victim to the disease of statism or socialism or whatever you want to call it.

The Scheme Can't Work

But there's a catch here, too—a great big one: *The scheme can't work.*

True, it might get a plant or two built that otherwise would have gone elsewhere. Some towns and cities—and a few states—have provided plants in ways a lot like this.

Probably Mr. Little, in proposing the plan, had only such a limited objective in mind; Rhode Island would get a new mill that might have gone to another area.

But some businessmen and bankers are looking for much more from the state-authority scheme. They see it as a way to get venture capital moving into new enterprise. They see it as a way for financial institutions bulging with the public's savings to invest some of that money in the bonds of a state authority, which would then provide plants for businesses that otherwise couldn't raise the cash to build them.

As such, the scheme won't work. A state authority simply *cannot* stick its neck out to take real risks. A few times, yes. In the important long run, no. Our look at "history" should make the point clear. A state authority's policy would be governed by an extreme caution—the same sort of caution that keeps old laws on the books forbidding trustees from making the investments that, in the light of today's changed conditions, might be the best for the national economy and for the investors.

Needed: Richer Diet for Risks

But it isn't enough to dismiss the Little plan. We must crack the nut at which it strikes such a glancing blow. If our economy is going to stay healthy, we must nourish it on a richer diet of risk capital. We must afford to put money into a lot of ventures that will fail—because the ones that by some chance succeed often can't be picked in advance.

At the same time that business finds it hard to get real venture capital, funds are piling up in what the economists call "institutions"—life insurance companies, savings banks, and other trustees for individuals' savings.

These institutions get a far larger slice of personal savings than they did before the 1930's. Taxes and other laws have put a bigger and bigger share of the total wealth and income into the hands of the nonwealthy—people who have little choice other than to turn their savings over to trustees to invest.

Even if there were changes in tax laws to give individuals more incentive for risk investment, it is not likely that the trend toward institutionalization of savings would halt. One reason: Think of the size funds that trustees will control as pension plans spread—and grow!

In short, institutionalization of savings is here to stay. The problem is to get a healthy flow of funds from institutions into risks.

What to Do About It

One way is to modernize the laws that govern investments made by insurance companies and other trustees. Let them make part of their funds available to business on an equity basis by buying common stocks.

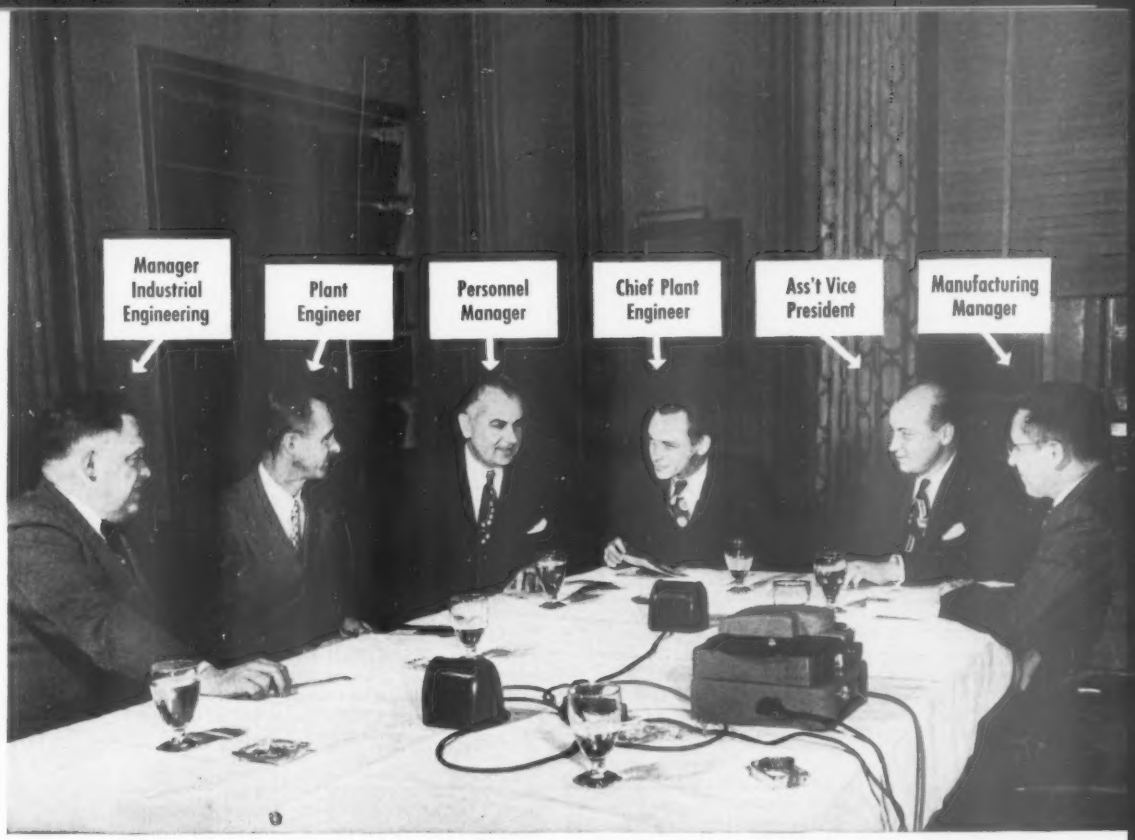
That alone would not funnel more savings into risks. But the insurance companies could thus supply capital to older, better established business. Then, with properly designed tax laws, the newer and riskier enterprises could make a bid for the private investors' money.

No doubt the formula isn't so easy as this. But this is the direction that public policy must take. You may find it a dull subject to write about to your Congressmen—and your state legislators. But as an industrial executive, you couldn't find a more important one.

ABOUT OUR NEW COVER

With this issue, FACTORY adopts a new cover. This is our aim: to highlight each month, for busy readers, the articles of special importance that are a MUST for all subscribers NOW.

This means giving up our old practice of listing all articles on the cover. To plan your reading of FACTORY, turn to page 3 for an expanded table of contents. There all the articles and departments are classified for easy identification.



Harold Engstrom, Sylvania Electric | H. M. Bradley, Manning, Maxwell & Moore | Joseph J. Morrow, Pitney-Bowes | George S. Stringer, Ford Instrument | C. A. Woodhall, Walter Kidde | George A. Richroath, Sperry Gyroscope

These practical plant men told us what they want to know about

PENSIONS

Their questions are the questions you would have raised.

FACTORY invited these typical plant executives to lunch with the editors in the McGraw-Hill Board Room. There they discussed—and sometimes argued—the problem of what operating men *really* want to know most about pensions. The entire discussion was recorded. After studying the recording, the editors selected from scores of questions the twelve that stand out as being of prime importance.

Carroll W. Boyce and M. J. Murphy, Associate Editors, have assembled the information these men told us you will want.

FOR FACTORY'S ANSWERS, TURN THE PAGE

". . . how will industry be able to pay for all the pension plans that are being set up, not to mention all the new ones being demanded? Where is the money going to come from?"

Harold Engstrom • Manager, Industrial Engineering
Sylvania Electric Products Co., New York

FACTORY'S ANSWER: The money is going to come from the consumer. And don't fall for the argument that "productivity increases" will pay for pensions. No matter how much productivity increases, the consumer will still pay the bill. The price reductions he'd normally get will have to go for pensions. Whichever pocket you take it from, it's still the consumer's pocket.

And don't let anyone forget that wage earners are the largest part of the consuming public. So it's really going to be wage earners who will pay most of the cost of pensions—whether or not they're contributing.

That's the long-term picture of where the money will come from. Short-term, most of it will come from the same place. As new pension plans are started, some of the money required to set them up may come out of surplus available for dividends or expansion. But dividends, as a percentage of national income, have already been cut to two-thirds the 1939 level; capital investment funds are below industry's requirements for maintaining an expanding economy. So until productivity rises enough to "pay for" pensions at current prices, we'll probably have price rises.

That probably means another round of inflation in 1950. The steel settlements alone may be enough to get it started. But steel is by no means the end.

All signs point to the fact that we are heading into a pension economy. If depression comes during this transitional period, then we are in for serious trouble. Only so long as the nation can absorb price increases can we start broad, new pension programs. Without that ability, industry will have trouble continuing the pensions being started now, let alone new ones.

If you're willing to accept the possible political and social consequences of a pension economy, then you may find that pensions have a stabilizing influence in future depressions. *May* find, because there is an important condition: To do much good in a depression, pensions would have to be on a prepaid basis.

There is another point not to be missed in connection with pensions: Even private pensions may mean new, higher taxes. Most private plans are tax exempt, so money that would produce taxes for Uncle Sam will no longer be a source of revenue. What remains will have to be taxed at a higher rate—unless the government decides to cut expenses.

". . . how can a supervisor answer a question like this: 'If an employer is going to put up 10¢ an hour for pensions anyway, why does it make any difference whether or not employees contribute?'"

George S. Stringer • Chief Plant Engineer
Ford Instrument Co., Inc., Div. of Sperry Corp., Long Island City

FACTORY'S ANSWER: Employee contributions do three important things:

For the employee: They provide larger pensions than would otherwise be possible.

For both employee and employer: They establish a sense of participation that gives each a greater appreciation of the contribution being made by the other.

For the employer: They provide an additional argument to be used in resisting union demands for unreasonable pension increases. With the contributory principle established, management can make a very reasonable counter-demand that employee contributions be increased, in the same ratio. If the increase demanded is small, this will not be likely to cause trouble; if it's big, the union may not be able to sell its membership.

There are other reasons a supervisor can give for contributory pensions. If an employee dies or leaves the company, everything he has paid in is returned to him or his widow. This seldom happens in a non-contributory plan, and when it does it is usually only after many years of service. If an employee has contributed, his pension is tax free, up to the amount of his contribution. If the company pays for it, the pension is taxed—at a time when the receiver will be less able to afford taxes than he is today.

It's a good idea to keep this last point in mind when a union starts throwing this argument at you (or your workers): "When workers pay . . . the money is subject to withholding tax. By direct employer payments . . . almost 20% more benefits can be had."

The quote is from instructions of the United Auto Workers Union to its negotiators. UAW "forgets" that the employee never pays more than half, so the possible increase in benefits is 10%. And in many contributory plans, the employer puts up 3, 4, and occasionally 8 times as much as the employee. That reduces the possible increase to less than 5%.

But an employer should be careful to avoid the mistaken idea that $1 contributed by an employee will reduce the cost to the company by $1. Just returning contributions to survivors of employees who die before retirement will reduce the amount of "employee money" available for pensions at 65 to somewhere between 60% and 80% of the amount contributed. How much further it will be reduced by returning contributions at the time of voluntary separations will depend on the company's turnover rate.

". . . pension costs vary from company to company, of course, depending on the make-up of the work force and the type of plan. But looking at the whole picture, is there any way of figuring what pensions are likely to cost?"

H. M. Bradley • Plant Engineer
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

FACTORY'S ANSWER: We know that a paid-up pension of $100 a month for a man 65 costs about $14,500, based on life expectancy. We know that about 500,000 workers in nonagricultural industries reach 65 each year. If we assume each of those workers will get a pension of $100 a month, the annual cost would be about $7¼ billion.

We also have about 2¼ million workers who are already over 65. For some, pensions of $100 a month would cost less than $14,500 (because if the worker is over 65, his life expectancy isn't so great). If we assumed the cost was half of that, there is an immediate charge of about $15 billion for retiring present over-age workers.

A really sound pension requires that money be set aside year by year, rather than waiting until the day a man retires to put it up. This is called "funding past service credit." How much this costs depends on how old workers are.

The new Ford pension will provide $100 a month, including Social Security. The cost to Ford of funding past service credit is estimated at $200 million. That's about $2000 for each of 100,900 workers. For a straight $100-a-month private pension, the cost would have been $2500 or more.

Let's see how this would work out for all workers if we assume the Ford cost is typical. There are now about 49 million nonagricultural workers under 65. At $2500 each, the cost of funding past service would be over $120 billion. It is customary to fund past service credit over a 10-year period, so the cost would be about $12 billion a year.

Once past service credit is funded, payments into the pension reserve will remain there for a period of years before they are paid out, so some interest will be earned. If they stay in the reserve an average of 20 years at 2% interest, only 72¢ must be paid in to have $1 on the day a man retires. The annual carrying charge would therefore be reduced to 72% of $7¼ billion, or about $5 billion.

Adding these charges up, we see that $100 a month at 65 for all nonagricultural workers would cost $32 billion in 1950, $17 billion a year from 1951 through 1960, and about $5 billion a year thereafter.

There's an old saying: "It ain't the cost, it's the upkeep." With pensions, the situation is just reversed.

". . . how can industry handle the problem of the man who should retire before 65 for his own good—and the company's?"

Joseph J. Morrow • Personnel Manager
Pitney-Bowes, Inc., Stamford, Conn.

FACTORY'S ANSWER: Retirement before age 65 is one of the toughest problems in the pension package—especially in the case of the man who is physically or mentally no longer capable of working efficiently.

Here's why: If you start putting aside $217 a year for a man when he is 30, when he is 65 he will get $100 a month. By the time the man is 60, you would have enough money to get him about $80 a month—to start at age 65. If the pension is to start at age 60, the man would get barely more than $50 per month. To bring this up to a pension of $100 a month to start at age 60, the employer would then have to put up around $9000—over and above what he had put into the reserve over a period of 30 years.

When you discuss early retirement, you will hear the experts talk about a pension "reduced to an actuarial equivalent of normal retirement income." This means you find out how much cash it would take to buy the pension that a man would get (based on service or earnings or both up to the present time) *if* he were now 65. Then you find out how much pension this amount will buy starting at the employee's present age. Because the employee will probably live more years than if he waited till he was 65, and because the employer will have been setting money aside for fewer years, the monthly pension will become smaller very rapidly as retirement age is advanced.

Unless the pension plan is unusually liberal, it will impose a real financial burden on a man to retire him on an "actuarially reduced pension" before 60.

Yet you can't make "exceptions" in a pension plan and keep it on a sound basis. One way out is for the company to supplement the reduced pension by paying the employee a "gratuitous income"—entirely apart from the pension. Even this opens the doors to all sorts of pressures based on the "precedent".

It's a rude shock, both psychologically and financially, for a man to discover that because he has reached 65 he has no job and a reduced income. It's a still ruder shock for the man under 65.

There is a big job here for the personnel department or the pension committee of a company faced with the problem of retiring men below 65. Try to spot such men early. Explain the situation. See if you can't transfer the man to a job where his usefulness will be extended. Maybe he can be given a part-time job—or perhaps you can find one for him outside.

Continued on next page

"... some men who reach 65 don't want to retire, and they may be good men the company doesn't want to see retire. How can a company handle the problems created by a fixed retirement age?"

George A. Richroath • Manufacturing Manager
Sperry Gyroscope Co., Inc., Lake Success, N. Y.

FACTORY'S ANSWER: Delayed retirement isn't too difficult to handle—if it's provided for in advance. You can't do it by making "exceptions" for some employees and not for others. Despite the fact that postponement of normal retirement reduces pension cost, it can endanger the whole financial structure of the pension unless past service credit is fully funded.

Here's an example of how it might work: Say you normally have 100 men who retire each year. For three successive years you let 50 of them continue working. Then, for some reason, all decide to retire in a single year. That will add an extra 150 to your normal yearly retirement of 100.

Even if the financial danger is not present, a policy of "exceptions" may cause mounting pressure from both employees and union to delay retirement on the basis of "precedent." This can cause an over-age, inefficient work-force. And if you have a tight seniority clause, it can be a major road block to upgrading.

Until unions entered the pension picture, the typical solution was to permit delayed retirement only with company consent. It is still a good solution *in theory*. But with unions sitting (or wanting to sit) on pension committees, and with pension disputes subject to grievance procedures, it is getting harder to put that theory into practice. Perhaps this is why fewer of the new plans permit delayed retirement—and why those that do almost always provide an upper limit (68 or 70) beyond which a man cannot stay.

To cushion the shock of a new pension plan to both company and worker, delayed retirement is usually automatic for those close to or over normal retirement age. A typical plan is to retire within one year those over 70, and to provide retirement on a "sliding scale" for those between either 60 and 70 or 55 and 70, so that retirements will be current in 5 or 10 years.

One of the byproducts of a fixed retirement age is the "unofficial seniority" workers are certain to gain. Layoff or discharge of a worker approaching retirement becomes more difficult. Even if no outside pressure is brought to bear—and you can be almost certain it will be—a supervisor will hesitate to recommend disciplinary action if there is any possibility of jeopardizing a worker's pension rights. Obviously, there is no stock solution to this problem.

"... what is going to happen if a company has to bargain with its union over new pension terms every time a contract runs out? Isn't it a long-term job to plan a sound pension program?"

George S. Stringer • Chief Plant Engineer
Ford Instrument Co., Inc., Div. of Sperry Corp., Long Island City

FACTORY'S ANSWER: Setting up a pension program *does* require long-term planning. There is growing evidence that most unions are adopting an attitude which will make long-term planning possible—within certain limits. Some of the new negotiated pensions provide for a five-year "freeze" on collective bargaining over provisions of the plan.

A period longer than five years is desirable for sound pension planning, but this is certainly better than having to bargain on pensions every time the contract runs out. However, there is one point that will bear watching: A five-year freeze will guarantee the pension plan if the contract is simply renewed or amended each year. But if the contract is actually permitted to expire, will the pension plan expire with it and thus be subject to renegotiation?

The answer to that probably depends on how your contract is written—and on the good faith of both the union and employer.

A possible safeguard would be to put the pension plan in a separate contract, and have the principal labor agreement merely call attention to the existence of the pension plan. One thing is sure: If you have an annual wage reopener in your contract, specify that pensions are excluded except at such times as are provided in the pension plan itself. And be doubly sure that pensions are excluded from any wage arbitration. An arbitrator, with the best of intentions, can wreck a pension plan merely because he is not qualified to handle all the complicated actuarial, financial, legal, and administrative details.

If a union adopts the position that management should bargain over pensions every year, there is likely to be trouble ahead. Setting up reserves for pensions which may change as little as 12 months hence is a virtual impossibility. From a practical point of view, there will be a situation in which the union feels it has to "deliver" something to its membership on pensions every year, and in which management will feel it has to continue the "status quo" just to provide the necessary stability—even though it might be in a financial position to accede to some or all of the union's demands.

When these difficulties are multiplied by a given employer having to deal with not one but several unions at the same time, only good faith and genuine cooperation by all parties concerned can produce a sound, workable pension plan.

"...the law now says that you can't change a pension plan unless your union agrees. What kind of situation is a company going to be in if it runs into a streak of financial bad luck, and the union will not agree to any changes in the plan?"

C. A. Woodhall • Assistant Vice President
Walter Kidde & Co., Inc., Belleville, N. J.

FACTORY'S ANSWER: When an employer can no longer pay the bill for pensions, he will be in the same position as the employer who no longer has enough money to pay the direct wages called for by his contract. That's as far as the union is concerned. Whether the union wants to bankrupt him by insisting on continuation of the pension program will depend entirely on how shortsighted the union wants to be.

However, there will be some nasty legal complications involved in terminating a pension plan. Most pension plans are tax exempt. To get that exemption, they must meet certain requirements of the Bureau of Internal Revenue. One of these is that the plan be permanent—it can be terminated only in case of "financial necessity." And the bureau is the sole judge of "financial necessity."

The catch is this: If you terminate a plan and the bureau decides that there was no "financial necessity," you can be held for federal taxes on all past payments into the pension fund. So there's a pretty stiff penalty for terminating a plan unless you're practically bankrupt.

In that situation, any union even remotely interested in the welfare of its membership will probably go along. We saw a somewhat parallel situation earlier this year when one of the locals of the CIO Rubber Workers accepted a wage cut—at the same time that other locals were striking for a pay increase.

There are two other things to be kept in mind in connection with reducing pension costs:

1. You can't reduce benefits retroactively. The Bureau of Internal Revenue says that's the same as terminating a plan. You'll lose your tax exemption for past as well as future pension payments.

2. You can't recover funds already allocated to pension reserves. Even if the plan is terminated, money paid in must be used to provide pensions as long as it holds out.

3. You probably can't set up a temporary plan even by foregoing tax exemption. A plan specifically labeled "temporary" was recently abandoned; it just wasn't put into the next year's labor contract. A New York court held that the company was liable for pensions "in perpetuity" to those employees who had become eligible for them during contract.

"...some unions are telling workers that pension plans set up through insurance companies are too expensive for what the worker gets out of them. If a worker comes to his supervisor with such a complaint, what is the answer?"

H. M. Bradley • Plant Engineer
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

FACTORY'S ANSWER: By making a very careful study of the death rate among persons of all ages, the insurance companies have been able to make up what is called a mortality table. This shows the average number of years a person of any given age can expect to live. The latest official mortality table is based on experience prior to 1937. This table shows that a man 65 will, on the average, live 14.4 years or 172.8 months.

If a man is to receive $100 a month starting at 65, he will receive 172.8 times $100, or $17,280—if he is an "average" man. However, it isn't necessary to put up the whole $17,280 when he is 65, because some of the money will earn interest for 14 years, a little more for 13 years, and so on. By combining this interest rate factor and the mortality table, you get what is called an annuity table. That table shows the cost at any time of an income of so much per month from any given age for the rest of a man's life.

When a pension plan is set up through an insurance company, the cost is determined by the annuity table, plus administrative expense. Administrative expense is called a loading factor, and is usually 8% of the cost of the annuities. If a worker says 8% is too much, the supervisor can point this out to him: The 8% has to cover not only administrative expense but also the "risks" the insurance company takes. If a certain group of employees live longer than expected, the insurance company has to pay their pensions anyway. And because of improvements in medicine alone since 1937, life expectancy for a man 65 is now more than 14.4 years. As soon as a new annuity table is ready, pension costs will go up. Until then, the insurance company must absorb the higher cost out of its 8%.

This does not mean insurance companies are in business to lose money. The question comes down to this: Can the individual company afford to take its own risks, or is it better off to pay a premium (the insurance company's profit) to have someone else take the risk? There are many factors involved in this decision, but if a company can stand the risk, then the employees (and the company) will probably gain through a trust plan.

There is one more thing that can be pointed out to a union or to employees if you want to support a decision in favor of an insured plan. An insured plan is necessarily an actuarially sound plan. A self-administered plan may or may not be.

Continued on next page

". . . workers tend to move from plant to plant. What can be done to provide pensions for such workers? Is expanded Social Security a possible answer?"

C. A. Woodhall • Assistant Vice President
Walter Kidde & Co., Inc., Belleville, N. J.

FACTORY'S ANSWER: An expanded Social Security program is one *possible* way to provide retirement income for workers who move from plant to plant (and thereby lose pension rights).

Social Security could also help the employee who works for a company that does not have a pension plan. Despite the claims of some unionists, not every company will some day have a pension plan; even in good years, only about half of all companies make a profit, and 5% to 10% will cease to exist. If pensions are to be considered a matter of "right" for every worker, Social Security may be the only way.

But we have to be realistic about this problem. The pension plans now in existence would not be dropped even if Social Security were increased to the point where it would provide ample pensions for workers over 65. The result might be to make the present problem even more acute by placing a still bigger burden on those employers who have stretched themselves to the limit to provide private pensions.

One solution to this problem is in the recent settlements that provide for a pension of so much a month *including Social Security*. But increases in benefits that seem certain to pass Congress next year will bring higher Social Security taxes—higher even than the new rates that take effect Jan. 1. The new taxes will be levied equally on employer and employee.

The unions will not miss the point that this, in effect, means gradually increasing employee contributions toward a pension of a fixed amount. When such pension plans come up for review, it's a cinch the unions will ask employers to "make up the deficit."

One way around this problem is to set a scale of pension benefits that includes one half of Social Security, since that is the amount of the employer's contribution. This plan was not uncommon in pension programs set up before unions entered the picture. If the assumption is made that $1 of pension under Social Security costs neither more nor less than $1 of pension through a private plan, total pension costs to the employer will be held at a constant value.

Here's a possibility to keep your eye on: As more pension plans call for benefits that include Social Security, there will be increasing union pressure on Congress and the Administration to have employers bear the entire cost of Social Security.

". . . some unions claim they have the answer to the problem of pensions for workers who move around a good deal. As an example they cite the UAW's 'Toledo Plan.' How about this Toledo plan? Is it any good?"

George A. Richrooth • Manufacturing Manager
Sperry Gyroscope Co., Inc., Lake Success, N. Y.

FACTORY'S ANSWER: As a solution to the problem of providing pensions for workers who move around a good deal, the United Auto Workers' "Toledo Plan" is only so-so. There are two reasons for this: It is limited to members of one union and to workers who remain in one area.

Roughly, here's what UAW proposes: All employers in the area with UAW contracts—about 125—would contribute 10¢ an hour per employee to a pension fund which would be administered by 11 UAW representatives, 11 employer representatives, and one "neutral."

The plan might be a solution to the problem of pensions for small companies except for two things:

1. It will not cover all plants in the area, much less all plants in the country. The plants that participate will therefore be at a competitive disadvantage by having a labor cost approximately 10¢ an hour higher than competing companies. If the plan spread far enough and fast enough, this disadvantage could be overcome by placing the same burden on all.

2. There is no guarantee that the plan will be actuarially sound. While UAW retains a competent pension consultant, apparently either he has not been consulted or his advice has been disregarded. The reason for this conclusion is that UAW in Toledo is still trying to make up its mind just how big the pensions will be, and what additional benefits (death and disability) will be paid. But even if the initial scale of benefits is set at an actuarially determined level, there will be a big danger in such a jointly administered plan. For the first few months or years of any sound plan, money comes in faster than it is paid out—because of the relatively few employees who retire (peak load in total number of employees on pension should be reached in 14.4 years).

The growing reserve in the first few years could well start burning a hole in the union's pocket. It would certainly be embarrassing to explain to members. So there's a good chance benefits would be increased above an actuarially sound level.

Remember how this happened with Social Security? Instead of increasing taxes, which were set by law, Congress passed resolutions every year keeping the level of contributions at 1%. As a result, contributions will now have to be inceased on an accelerated schedule—and even so there is doubt about the actuarial soundness of Social Security.

"... how can we provide pensions for transient workers and still retain the incentive character of pensions? Isn't there some way private industry can handle this problem?"

Harold Engstrom · Manager, Industrial Engineering
Sylvania Electric Products Co., New York

FACTORY'S ANSWER: Here's how some people say it could be done:

1. Provide that all payments into the pension be allocated to individual employees on a year-to-year basis. That is, don't wait until the employee is ready to retire before setting money aside out of the general fund for his pension; do it every year.

2. Provide for full vesting of pension rights. Full vesting, in effect, means that the employee is given a permanent right to any money set aside for his pension. If he dies before retirement, his heirs get this money. If he leaves the company for any reason, he either gets the money in cash, or, at age 65, receives whatever amount of pension can be bought with the amount of money in his "account."

3. Eliminate eligibility requirements for pension participation and vesting. Most pension plans now require that an employee must reach a certain age or have a certain number of years of service, or both, before he can start accumulating pension credit. Similar rules, usually stiffer, require a "waiting period" before an employee becomes vested—if at all.

4. Put the pension on a profit-sharing-plus-percentage-of-earnings basis. The fact that part of a man's pension depends on the company's profit position will give him an increased interest in the company's welfare. Basing part of his pension on his earnings will reward his personal effort and ability, and give recognition to the fact that factors beyond his control also influence profits.

Advocates of schemes like this say that a man could "earn" his pension, and he could "take it with him." The rate at which he earned pension credits might be different in one company than in another, but he would continue to earn them. When he finally retired, his pension might come from one or a dozen sources. But it would come.

Until recent years, pensions were thought of as a reward for long and faithful service contributing to the success of a particular company. Except for the fact that this tended to limit the mobility of the work force, this was the proper conception of pension.

The cost would be tremendous, but fully vested plans based on profits and earnings would return pensions to their proper function—and maybe keep "Big Government" out of the picture.

"... a lot of operating executives are just getting their feet wet in the whole pension problem. I think it would help if you could tell them where to turn for more detailed information."

Joseph J. Morrow · Personnel Manager
Pitney-Bowes, Inc., Stamford, Conn.

FACTORY'S ANSWER: The question highlights a point which should not be missed. FACTORY's answers have been for plant operation executives whose "pension responsibility" is generally limited to these two things:

1. Answering questions and handling complaints and grievances of workers.

2. Being able to offer constructive and informed opinions in management discussions of pensions.

Executives responsible for designing, negotiating, and administering the legal and financial aspects of a pension program need more details. Here's where to get them:

Bureau of Labor Statistics
Washington 25, D. C.

See especially two new bulletins in the series on collective bargaining provisions: "Employee-Benefit Plans; Part I — Health, Welfare, and Insurance Plans; Part II — Pension Plans." Bulletins contain provisions from over 400 labor agreements.

National Industrial Conference Board
247 Park Avenue
New York 17, New York

Bureau of National Affairs
1231 24th Street, N. W.
Washington 7, D. C.

See especially BNA'S new book, *Handbook for Pension Planning* ($5). It's written by seven pension authorities. Some of it is rather technical, but so is the whole subject of pensions. If it's technical material you want, don't miss this book.

Prentice-Hall Pension and Profit-Sharing Service
70 Fifth Avenue
New York 11, N. Y.

Insurance and trust companies can provide a wealth of "how to do it" literature, especially on the problem of financing pension plans.

When you have decided on the broad outlines of a pension plan:

Call in representatives of insurance and trust companies. They can be of real help in planning financial, actuarial, and administrative details.

Call in a competent pension consultant to get an outside point of view, even if you are certain you want an insurance or trust company to handle the plan you are going to set up.

IT COSTS NORTHWEST METAL PRODUCTS LESS THAN $10 EACH TO MOVE PRESSES AND GET FLEXIBLE LOW-COST LAYOUT

Move Machines to Job—and Cut

That's a Seattle company's solution to the problem of making a widely diversified line of products at low unit cost. Have *you* ever tried it?

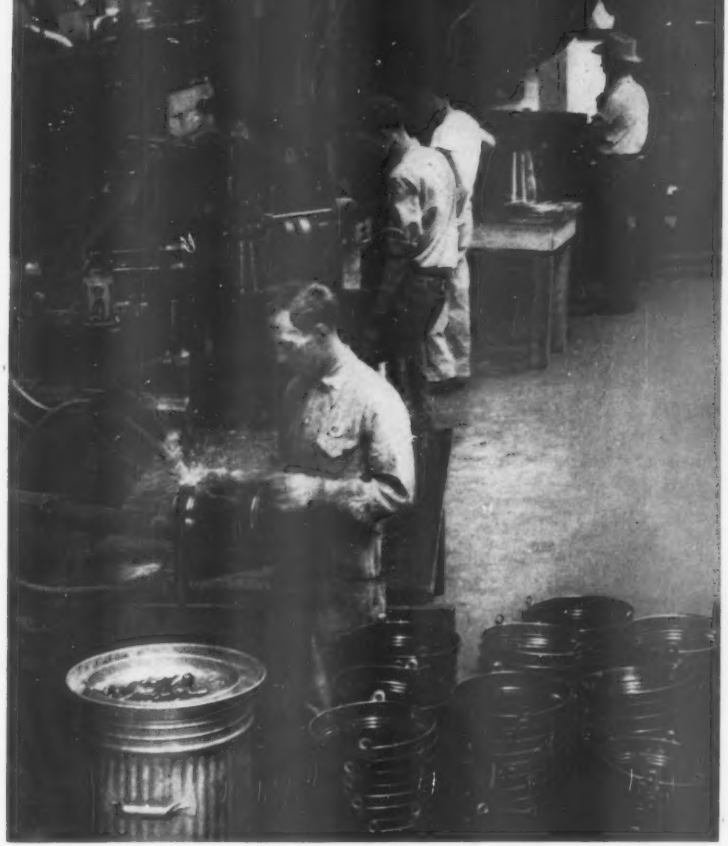
Do you make dozens of products? Is a fixed production line for each item impractical? Are you therefore sticking to process layout and passing up the low-cost handling inherent in product layout?

If your answer to this question is "yes," you may well consider the not-so-new but always effective technique of moving machines into production lines that are here today, gone tomorrow. You may profit from the experience of still another company that has tried this method—and finds it pays.

The company is Northwest Metal Products, Inc. This Seattle concern makes various things—from water pails to floor furnaces. Each item accounts for only a small fraction of its business. Fixed lines for each product are out of the question.

Northwest's solution is to move presses up to 60-ton rated capacity into temporary production lines. Heavier machines—250-ton presses, big shears, and press brakes—obviously must stay put. But Northwest can move some 100 smaller machines — punch presses, spot welders, beaders, seamers, and the like. And it *does* move them, on the average, three or four times a year.

▲ **HOW IT'S DONE**—with a fork truck—is shown in the photograph



PRODUCTION LINE HAS JUST BEEN SET UP TO TURN OUT A BRAND-NEW ITEM

Your Handling Costs

directly above. Northwest has two of these trucks, each with a capacity of 6000 pounds. Usually one is enough to make a move. Occasionally both are needed. In exceptional cases an overhead crane is pressed into service. Trucks are usually occupied in the conventional movement of materials and products. They leave that work whenever they are needed to move equipment.

An ordinary move takes not more than 45 minutes. It costs less than $10. The company doesn't spend any time charting moves on paper. If machines are moved into a production line that doesn't work out, they are moved again. If moving a press will save even one day's work, it's moved.

If machines are to be moved into a production pattern previously used, the foreman's word is all the authority the lift truck operators need. If the production line is a brand-new one, the factory superintendent calls the shots. A layout change usually involves one or two presses. But as many as eight have been moved for a new operation.

Presses are seldom fastened to the floor. If they must be, existing bolt holes are used so far as possible. Numerous overhead outlets supply the power. In some sections of the plant there are outlets every five feet in conduits about 10 feet apart.

◄ **HOW IT WORKS OUT** is shown in the photograph at left. This production line was set up to turn out a new item—a 10-qt. pail. Seven machines make up the line. The punch press farthest from camera (shown in part at extreme upper right) folds both edges of a light-gage black-iron sheet, previously blanked. Second press fastens the two pieces together, third press puts wire on top of pail. Then a power roll flanges the bottom edge of the pail body, which goes through a double seamer before another roll puts on the bead. In the final operation, nearest the camera, a welder puts ears on the pail. Pails are then ready to be trucked to the hot-dip tank 50 feet away.

Another company product is a child's scooter. The front fender required one blanking operation, one difficult deep drawing operation, and three subsequent trimming and piercing operations. A big 250-ton press, to do the deep draw, was selected as the center of operations. Moved around it were a 75-ton press for blanking, with a 93-ton and a 35-ton press for subsequent operations.

After three months, the smaller presses were moved into another building near the seam welders and used in an assembly line for camp cook stoves. A month later they were being used to make parts for oil furnaces.

Machines are moved not only within the plant but also outside, if the occasion demands. Recently, for example, the company received a rail shipment of hot-rolled strips in 30- to 40-ft. lengths. Instead of trying to move such unwieldly pieces into and through the plant, Northwest wheeled a 50-ton press with a cutoff die out to the spur track and cut the material into the desired lengths.

When a press needs major repairs, it is moved into the tool-and-die shop. There it stays until the repairs have been completed and the press has been tested.

Don't jump to the conclusion that moving is hard on the presses and that frequent repairs are necessary. Breakage is practically nonexistent, being confined to an occasional cast part. It is more than offset by the saving in materials, which often used to be damaged in transit.

IDEAS OF THE MONTH

ATOMIC POWER IN INDUSTRY—HOW SOON? Go ahead and build that steam power plant. Don't be afraid atomic power will obsolete it in a few years. That is the implication of a recent speech by Philip Sporn, president of American Gas & Electric Service Corporation. He sums up: "Six to ten years from now we may have a reactor producing electric power. Four to five years after that we may have some commercial generation of electric power, commercial only in the sense that it will be operating more or less regularly, day in and day out."

WHO DROPPED THAT CARTON? If you ever want to know what happens to a particular shipment, try the Impact-O-Graph. It will record all the bumps, enables you to trace damage back to shipper, carrier, or receiver. Cleveland Impact Recorder, Inc., makes it.

HYDRECO HUNT... is what Hydraulic Equipment Company, Cleveland, calls its cost-reduction program. Each month it picks a product, makes cash awards for cost-cutting suggestions. In October, Hydreco sharpshooters trained their guns on a hydraulic cylinder, scored bull's-eyes all over the place. They redesigned the cylinder, improved production methods, got lower prices on purchased materials, made important savings in tooling. Total cost reduction: 43%.

THE LUMINOUS CEILING... may be the answer to your lighting prayer. No reflected glare, no troublesome shadows, say the MIT engineers who developed it. Cost? About the same as any good lighting system. The luminous ceiling is made up of fluorescent lamps mounted on a white plaster ceiling behind diffusing plastic sheets. It uses twice as much current as a conventional system, but gives six times as much light. MIT has given this ceiling a thorough try-out in one classroom and two offices. . . . The same engineers have come up with special cylindrical light fixtures as another solution to lighting problems. Upper half is transparent plastic, lower half, diffusing plastic. They reflect most of their light up to a white ceiling, and are being used successfully in drafting rooms at the Institute.

AND NOW—HEATLESS WELDING · Pressure takes the place of heat in a welding method controlled in the U. S. by Koldweld Corporation, New York. The process was developed in England. Koldweld says it has been used successfully with several nonferrous metals—aluminum, dualumin, cadmium, lead, copper, nickel, zinc, and silver.

21,000 AMPS, 18.7 VOLTS! Need high-amperage direct current at low voltage? Then you will be interested in a new homopolar generator developed by Electric Products Company, Cleveland. It is rated 400 kw., delivers 21,000 amperes at 18.7 volts. It will supply pure direct current for nuclear research at Carnegie Institute of Technology. Slight changes in size and design, says Electric Products, would make it possible for this generator to deliver 100,000 amperes or more.

for Factory Executives

NO WALLS, NO ROOF... and no dust explosions. That's the pay-off at Corn Products Company's new grain mill at Corpus Christi, Texas. Much of the construction is "open"—i.e., buildings have no walls or roofs unless process requirements dictate otherwise. Floors in such buildings are automatically windswept by an almost continuous breeze off the Gulf. The dust explosion hazard is eliminated. The same breeze blows away sulphuric acid fumes. The H. K. Ferguson Company designed and built the plant. Ferguson engineers had to overcome two climatic obstacles—Texas sun and Corpus Christi's rainy season. They say a similar approach to many problems can be taken almost anywhere in the United States.

PLANT MAINTENANCE SHOW AND CONFERENCE... at the Public Auditorium, Cleveland, Jan. 16-19. A group of 21 experts from industry will lead conference discussions of plant maintenance problems.

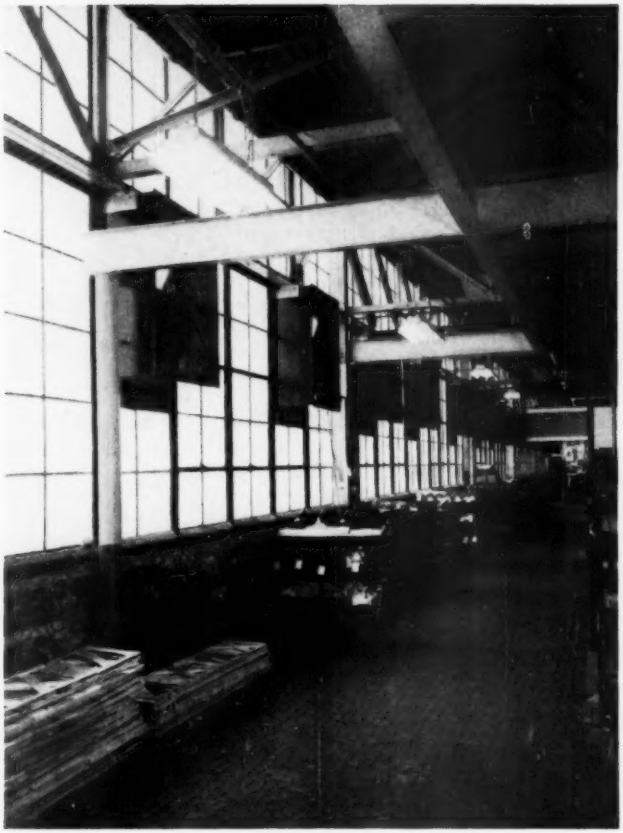
NO BUBBLES IN HIS ALUMINUM · David Z. Murphy, principal owner of Murphy Knife Company, Portland, Ore., has devised a new casting pot for aluminum. It eliminates bubbles caused by slag and impurities. Here's why: The Murphy pot is divided into two compartments. Aluminum to be melted goes into one side. As it melts, heavy impurities slide to the bottom, lighter ones float to the top. Pure aluminum is left free to flow to the second compartment—from whch it is dipped for casting.

HOW TO GO OUT OF BUSINESS · "If there are any superintendents, planners, or tool designers who think that present production techniques will always be sufficient, they're helping to scuttle the firm. If there's an accountant who ignores costs, a merchandiser who isn't serious about his pricing, or a purchasing agent who doesn't buy properly, each one is doing his part to shut the company's doors." From an editorial in *News and Views*, published by and for employees of Caterpillar Tractor Company.

COORDINATED CARBIDE CONTROL... announced last spring by Carboloy Company, Inc., helps manufacturers in the metalworking industry cut costs. The program coordinates all activities relating to cutting tools, including design, application, maintenance, standardization, inventory, machine idle time, etc.

IS THAT TRIP NECESSARY? Alert methods men ask that question of every move. In the old Yale & Towne Philadelphia plant, a certain part traveled 10,140 feet. In the new plant the same part travels 3380 feet. Reduction: 65%. You don't have to be in the materials handling equipment business to make similar savings.

RED MENACE · "If we were to operate the machines and equipment we used in 1939 at maximum efficiency and to the best of our ability, we'd be running in the red." That's what a top executive of a large corporation recently told a group of McGraw-Hill editors.



TWENTY-FIVE EXHAUST FANS CHANGE AIR IN EMERSON PLANT EVERY 20 MINUTES, WHILE SEVERAL HUNDRED . . .

Good Ventilation Beats Heat,

It's never too early to start worrying about summer heat and humidity. Here's how both were licked—in a town where it really gets hot and sticky

W. A. ALLISON · PLANT ENGINEER, EMERSON ELECTRIC MANUFACTURING COMPANY, ST. LOUIS

WORKER EFFICIENCY in the Emerson plant now stays just as high in hot weather as in cold. A new ventilating system has lowered in-plant temperatures 15 degrees during the summer. We couldn't use a mechanical cooling system, so this is quite an achievement—especially in St Louis, where our summers are hot and sticky.

We were faced with a tough problem. When the thermometer rose, worker morale and efficiency dropped. Something had to be done —quickly and effectively.

To make matters worse, the plant is large. The manufacturing area is located in a single-story, steel-frame building, 1000 feet long and 500 feet wide. The building runs north and south. It has a monitor-type roof. The lowest part of the ceiling is about 18 feet above floor level. Except for a few small departments partitioned off on one side, the entire floor area of the plant is wide open.

We couldn't air-condition a space

. . . AIR-CIRCULATING FANS HUNG IN STRATEGIC OVERHEAD LOCATIONS PREVENT THE FORMATION OF AIR POCKETS

Keeps Efficiency High

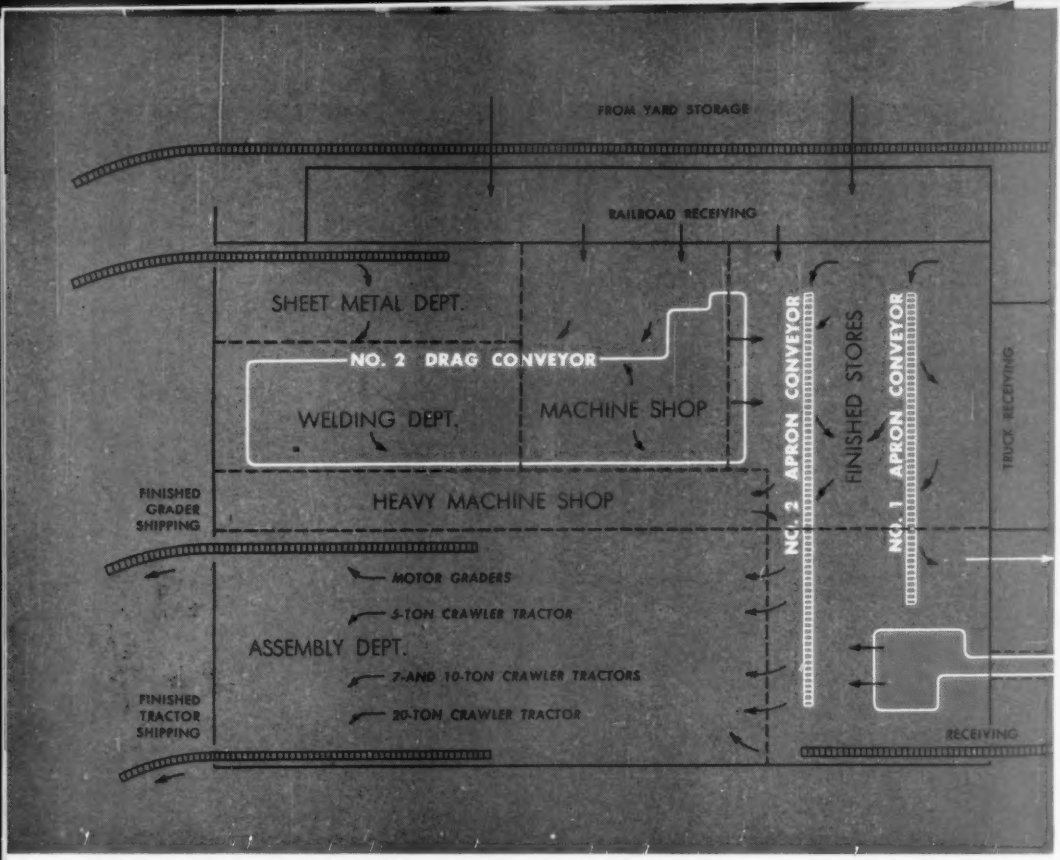
this big with a mechanical cooling system. Too expensive. Besides, the plant wasn't built for such an installation. But we could obviously improve the situation by providing good cross-ventilation.

Keeping this in mind, we began a careful study. In hot weather, prevailing winds come from the south. We used this fact in planning the new ventilation layout.

The first step was to check all windows in the south wall for size. We made sure they were big enough to admit lots of air. The north-wall windows were next. We got 25 48-in. exhaust fans, spaced them as evenly as we could in windows along the whole length of the wall. Each fan is belt-driven by a 1-hp. motor. Free-moving open-and-shut louvers on the outside keep out all backdrafts. We then sealed up every other opening in the north wall.

The idea was to get air currents to flow continuously through the building in one direction, south to north. To push these currents along, we put in several hundred air-circulating fans. They are 30 inches in diameter and hang rigidly from canopy fixtures attached to overhead structures. We distributed them in such a way as to break up any air pockets that might otherwise form. Some areas use process exhaust systems. We located the circulating fans where they would interfere as little as possible with the proper operation of the exhaust systems.

Each north-wall fan exhausts 21,000 cfm., giving a total exhaust capacity along the wall of 525,000 cfm. This means that the plant gets a complete air change every 20 minutes. That's the reason why we can keep in-plant temperatures in the summer 15 degrees lower than they were before.



ALLIS-CHALMERS TEAMS SIX FLOOR-LEVEL CONVEYORS TO GET SMOOTH FLOW OF PRODUCTION IN THREE BUILDINGS

Six-in-One Conveyor System Eliminates Long Hauls

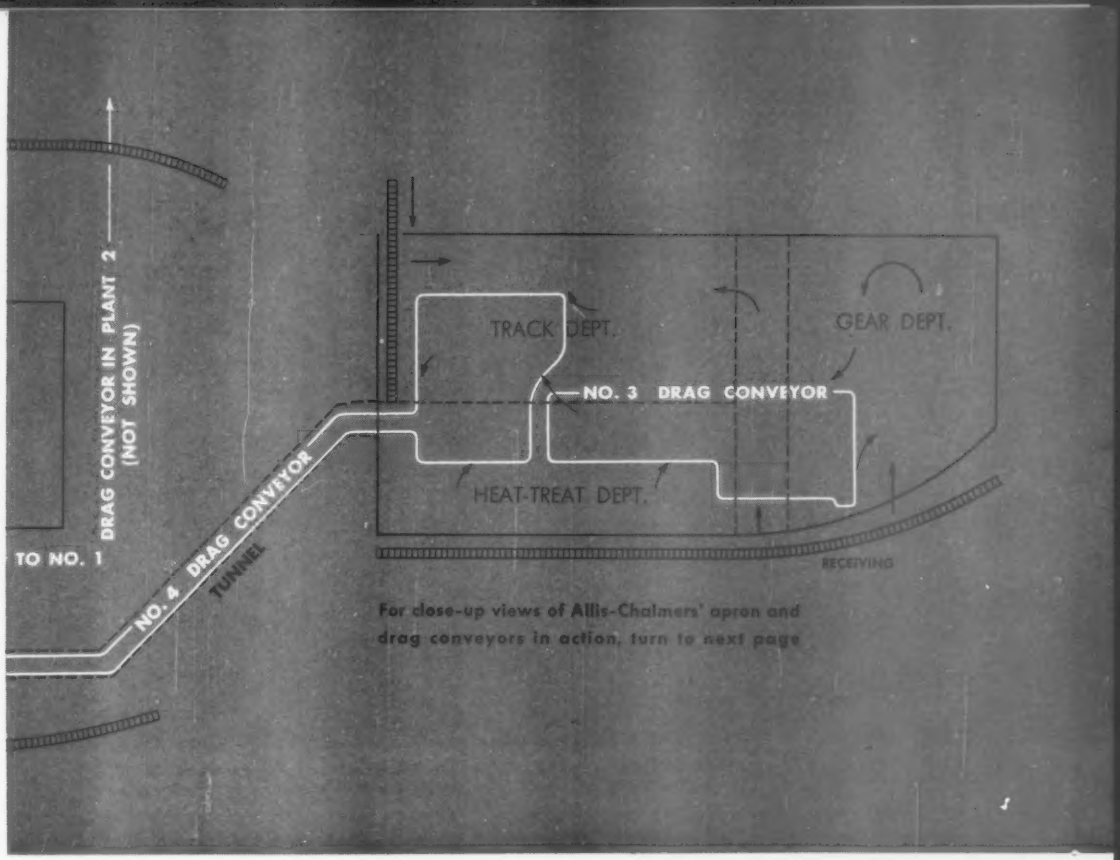
Integrated system also speeds up receipt of raw materials, inter-departmental moves of materials-in-process, and deliveries to final assembly lines

H. M. ALKIRE • ASSISTANT TO THE WORKS MANAGER, ALLIS-CHALMERS MANUFACTURING COMPANY, SPRINGFIELD, ILL.

AN INTEGRATED SYSTEM of six floor-level conveyors in our Springfield Works has all but eliminated long-haul, in-plant trucking. The whole system is 6830 feet long. And it's so effective that we have been able to transfer 34 material transport men to more productive work.

Adoption of the conveyor system highlighted our drive to improve materials handling methods. But we also added other accessory equipment. This included many cranes to aid production operations, and several power fork lift and hand lift trucks to take materials to and from apron conveyors.

The main idea was to develop an efficient flow of materials between the main building and two smaller ones some 500 feet away. This would yield the shortest possible


DRAG CONVEYOR IN PLANT 2 (NOT SHOWN)
TO NO. 1
NO. 4 DRAG CONVEYOR TUNNEL
TRACK DEPT.
GEAR DEPT.
NO. 3 DRAG CONVEYOR
HEAT-TREAT DEPT.
RECEIVING
For close-up views of Allis-Chalmers' apron and drag conveyors in action, turn to next page

. . . AND THEREBY ASSURES MINIMIZED HANDLING AND TRAVEL FROM RECEIVING POINTS TO SHIPPING PLATFORMS

processing distances between receiving points (for raw, semi-finished materials) and shipment of the finished products. To see how the six floor-level conveyors helped us do this, look at the plan layout shown on these two pages.

We chose two types of floor-level conveyors, each to meet specific needs. There are two apron-type conveyors. They move materials from general receiving to finish stores and final assembly lines. Four floor-chain, drag-type conveyors, with detachable wagons, move materials in and between production departments. Combined carrying capacity for the apron conveyors is about four million pounds per 24-hr. day; for the drag conveyors, five million pounds.

All six conveyors are synchronized at a speed of 10 feet per minute. Platforms of the apron conveyors are flush with the floor and sturdy. Power trucks can travel across them safely, and they are safe for pedestrians also.

The apron conveyors carry many kinds of materials: large subassemblies; skid boxes filled with small parts; and platform skids containing heavy, bulky items. Overhead cranes or lift trucks put the materials on or take them off the moving platform.

The drag conveyors employ four-wheeled wagons with flat, open platforms 3x4 feet in size. These platforms match the dimensions of the skids they often carry. Special draw-bars and hitches on the conveyor pull the wagons. An employee loads a wagon at any point on the floor, pulls it to the conveyor, and hooks it up. When it reaches the delivery point, someone else quickly detaches the hitch and takes it off the conveyor.

Usually we only use the wagons to pick up and deliver materials via the conveyors. They are not intended for intra - departmental transport.

Here's how the conveyors function to give an efficient, well-integrated system.

No. 1 Apron Conveyor, 380 feet

Takes purchased finished materials from receiving to an inspection area, then to finished stores. Also carries assembled motors from finished stores to a shipping dock. (From here they travel by motor truck to the spare parts storeroom in Plant 2, one mile away.) Platform is 42 inches wide.

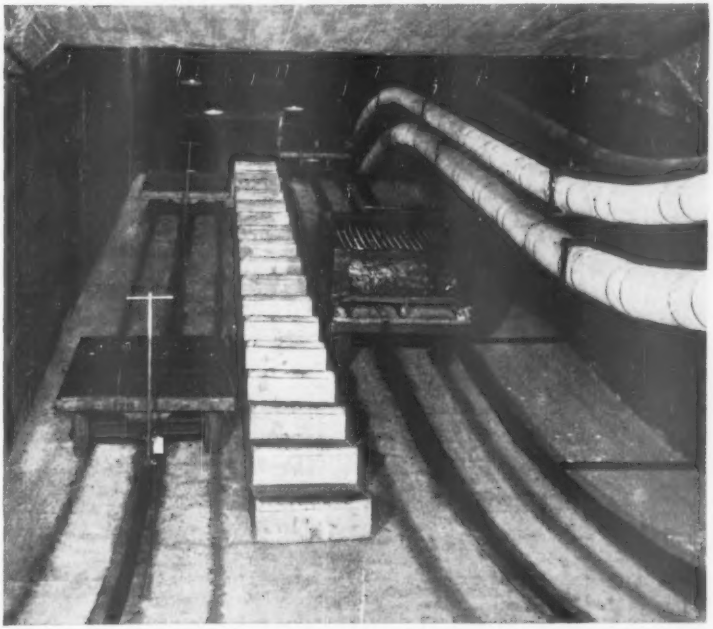
No. 2 Apron Conveyor, 570 feet

Parallels No. 1. Delivers parts from finished stores to the head of each of four assembly lines. Also takes purchased finished materials from receiving to finished stores;

APRON CONVEYOR delivers parts from finished stores to the four assembly lines, 300 to 500 feet distant. It also moves purchased parts from receiving points to stores department ➡

DRAG CONVEYOR moves work-in-process between departments in detachable wagons. The Springfield Works uses four of these drag conveyors, ranging in length from 750 to 1946 feet ➡

FOR HEAVY LOADS like this skid box, credit the overhead crane with an assist. Power trucks take skid boxes off conveyor at delivery end



TRIP THROUGH TUNNEL by drag conveyor solves problem of crossing four railroad tracks and highway. Tunnel is 450 feet long

occasionally moves large unfinished materials from receiving to the machine shop. Platform is 60 inches in width.

No. 1 Drag Conveyor, 1726 feet

(This conveyor is in Plant 2, so it doesn't appear in FACTORY's layout.) Carries material through storeroom, spare parts storage, and receiving department of Plant 2. Also takes spare parts to the shipping platform for delivery to the main plant.

No. 2 Drag Conveyor, 1460 feet

Moves materials to and from the machine shop, sheet metal department, and welding shop. Finally carries them to finished stores.

No. 3 Drag Conveyor, 750 feet

Connects heat treating and gear-cutting departments in the annex building. Delivers shafts, after heat treatment, for machining in the gear department. Brings gears for heat treatment, then takes them back to the gear department for finish grind.

Wagons carrying finished products are moved to No. 4 drag conveyor (at the transfer point) for delivery to finished stores in the main plant.

No. 4 Drag Conveyor, 1946 feet

Picks up finished machined parts from the track department in the annex; brings them to finished stores in the main plant. From here they travel to the assembly lines on No. 2 apron conveyor.

The route involves a difference in building levels of 13 feet. It also leads through a 450-ft. tunnel under four railroad tracks and a heavily traveled roadway. (Previously, power-lift trucks had to move all materials on the dangerous grade crossings between the two buildings.) A special drag-chain hitch stops the wagons from tearing loose while running up or down the tunnel incline. The tunnel also serves as a safe connecting passageway for pedestrians.

The six "perpetual motion" conveyors and accessory equipment have benefited us in other cost-saving ways. They have speeded up transport time between departments. Employees no longer wear themselves out lifting and loading materials. And the endless drag conveyors give us all the advantages of a traveling stockroom. This reduces the over-all requirements for floor storage area.

MR. WRONG: Goggles and rubber gloves! What do they think I am?

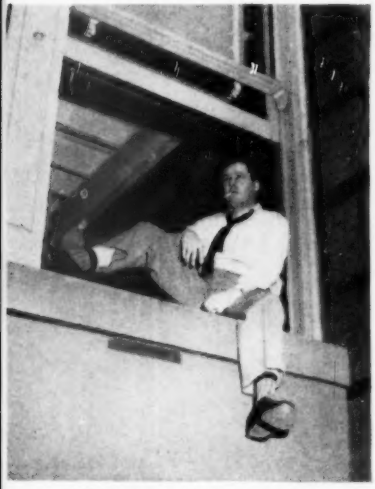
Narrator: Well—You're a workman with two good eyes—so far. And one of these days you're going to get that long, dangling necktie of yours chromium plated! What do you think, Mr. Right?

MR. RIGHT: I follow the safety rules. Plating is just as safe as any other kind of work if you keep your goggles in place and wear your rubber apron, gloves, and boots.

Narrator: Personally, I think Mr. Right's way shows the most sense.

MR. WRONG: (Angrily) I get all the bad luck! My best tie caught on this greasy machine. The company oughtta pay for it.

Narrator: The company does pay for a locker for Mr. Wrong's necktie and jewelry, but he won't use it —won't even take the trouble to



MR. WRONG: Nice day to go fishin'!

Narrator: Mr. Wrong may never go fishing if he isn't careful. Sitting in a factory window is against the rules and a dangerous thing to do. Aside from the matter of safety, it doesn't give passers-by a favorable impression of the factory.

MR. WRONG: Me, I ain't no sissy. I just believe that safety screens are for panty-waists. I should raise and lower that gadget every time I put in a piece of wood?

Narrator: As late as Mr. Wrong gets up, he ought to be an authority on sawing wood. Here's his idea of operating a crosscut saw—

MR. RIGHT: I never start the saw until the screen is down where it ought to be. It only takes one slip to cost a man a finger.

Narrator: Quite true, Mr. Right—and the company carries no replacements in stock for crosscut fingers.

stuff the ends of his tie into his shirt. And now—Mr. Wrong is doing a very good job of getting his shirt sleeve messed up, too.

MR. WRONG: (Growling) Well—as long as my tie is all messed up—what do I care about my shirt?

MR. WRONG: Me, I can handgrind with one hand tied behind my back.

Narrator: Maybe he could, but how about goggles? Grit from a grinding wheel won't do his sight any good. What do *you* say, Mr. Right?

MR. RIGHT: Why use only one hand when you've got two? And I wouldn't think of starting to grind any metal unless my goggles were in place. I keep my eyes on what I'm doing, always watch the work.

MR. WRONG: First one to the parkin' lot, that's me.

Narrator: But in his haste he just missed taking a header that might have ruined his profile.

Mr. Wrong versus Mr. Right

Sound slidefilm shows up careless work habits, dramatizes for new employees good ways to do the job

F. J. HILLGRUBER • SAFETY DIRECTOR, NATIONAL CASH REGISTER COMPANY, DAYTON, OHIO

SHOWN HERE are frames from a new National Cash Register sound slidefilm called "ABC's OF SAFETY." We are using it to teach employees to observe and practice safety methods.

The story in this film is built around two characters — "Mr. Wrong" and "Mr. Right." To give the film authenticity, professional actors were photographed on actual jobs which, without following safety rules, could result in accidents or injury. Mr. Wrong shows how easily accidents can happen by improper operation of machinery and by ignoring safety rules. Mr. Right shows how simple it is to continue on the job, without injury and loss of time, by simply following the safety rules outlined by the company.

This slidefilm is shown as part of the employment routine to all new NCR employees before they go on the job. In some instances, where the work may be of hazardous nature if safety rules are ignored, the new employee discusses possible accident and safety aspects of the job with the safety director before going to work.

Fewer Motor Failures—If You Use Protective Enclosures

When you shield motor windings from water and other harmful agents, you have eliminated an important cause of breakdowns

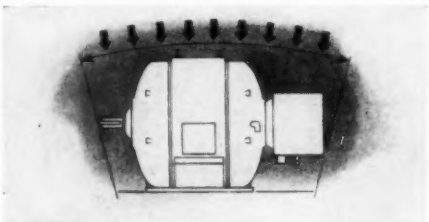
D. G. MAXWELL • ELECTRICAL ENGINEER, ELECTRIC MACHINERY MANUFACTURING COMPANY, MINNEAPOLIS

SUITABLE PROTECTIVE CONSTRUCTION will do a great deal to prevent motor failures. That helps to reduce operating and maintenance costs. Liquids, excessive moisture or dirt, and corrosive fumes are harmful to motor windings and internal parts. They cause deterioration that may easily result in eventual failure of the motor.

It is easy enough to say that motors should not be exposed to such things, but it may be virtually impossible to avoid doing so. Oftentimes motors must be located where atmospheric conditions are severe.

That problem is not new. To meet it, designers have in recent years developed several kinds of motor enclosures. The purpose of these enclosures is to give windings and other parts adequate protection under various conditions.

Protected motors cost more than the open type. Hence, both economy and safety dictate selection of the proper type of enclosure for the particular service conditions.



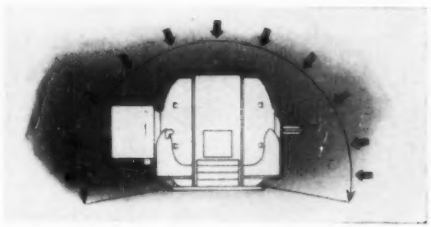
DRIP-PROOF

This is the simplest and cheapest of the protective constructions. According to the NEMA definition, a drip-proof machine is one in which the ventilating openings are so constructed that drops of liquid or solid particles falling on the machine at any angle not greater than 15 degrees from the vertical cannot enter the machine either directly or by striking and running along the horizontal or inwardly inclined surface.

For applications where open-type motors formerly were commonly used, drip-proof motors now are being specified as a minimum.

This construction is best suited where the absence of hosing down or splashing liquids makes unwarranted the more adequate protection of the splashproof construction. Comparative costs of the various types of motors are shown in the accompanying chart.

The cost comparisons are based on motors in the larger ratings (100 horsepower and over), but they are representative of the price increases for additional protection throughout the general electric motor field.



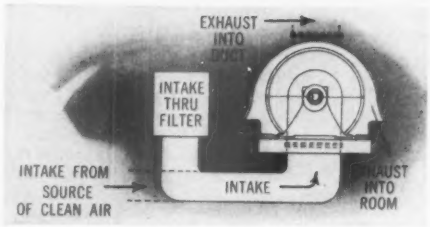
SPLASHPROOF

The ventilating openings are so constructed that drops of liquids or solid particles falling on the machine or coming towards it in a straight line at any angle not greater than 100 degrees from the vertical cannot enter the machine either directly or by striking and running along a surface.

Splashproof construction increases the protection of the motor against splashing liquids or flying particles. It is being specified for installations requiring this added protection. Typical applications in paper mills, where splashproof construction would be chosen over the drip-proof type, are on beaters, refiners, and hydrapulpers.

In many pumping and milling installations, where a hose may be used in washing down floors or where water may be blown against the motor, splashproof external protection helps to provide insurance against shutdowns.

Splashproof motors may be obtained for indoor or outdoor use. They should not, however, be used outdoors where snow is encountered in sufficient quantities to block the air discharge openings and prevent proper ventilation.

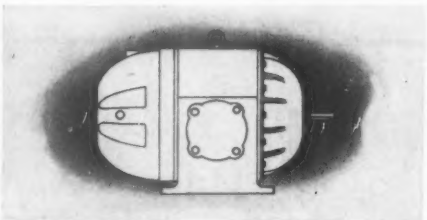


ENCLOSED, SELF-VENTILATED

These motors have openings for the admission and discharge of ventilating air, which is circulated by means integral with the machine. Otherwise it is totally enclosed.

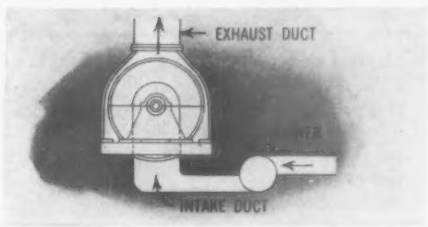
This type of enclosure is recommended where excessive ash, scale, or other airborne material, or high ambient temperature, makes it desirable either to draw intake air from a cooler location or to filter it. Ventilating air can be exhausted into the room through openings in the stator frame, or carried away through a duct. Since circulation of ventilating air is dependent on the rotor fan blades, definite limits on the length and size of duct work are necessary to insure adequate ventilation.

By using an air cooler in a closed circuit the ventilating air is continuously recirculated.



EXPLOSION-PROOF

It is impracticable to build a motor that is gas tight, but it can be made capable of withstanding an internal explosion of a specified gas without ignition of the surrounding atmosphere. This is accomplished by: (1) making the enclosing parts strong enough to withstand the pressure of an internal explosion; (2) making the fits long enough and close enough to cool the escaping gas enough to prevent ignition of the surrounding atmosphere.



ENCLOSED, SEPARATELY VENTILATED

Such motors have openings for the admission and discharge of the ventilating air, which is circulated by means external to and not a part of the machine. These openings are so arranged that inlet and outlet duct pipes may be connected to them.

In this construction, used particularly for engine-type synchronous motors driving compressors, circulation of the ventilating air is provided by a blower external to the motor. Use of a separate blower permits longer duct work, and makes it possible to ventilate the motor even when it is at standstill.

With well-built, tight enclosures these motors are considered fairly safe for use in explosive atmospheres, provided: (1) safe air is accessible; (2) the inlet and outlet pipes are kept tight; (3) the blower is started sufficiently in advance of the motor to drive all gas out of the motor enclosure. For this purpose the blower and synchronous motor control are interlocked so that the blower motor must be started in advance of the other.

Air may be circulated when the synchronous motor is not in operation by keeping the blower running continuously.

Blower and blower motor should be located at the inlet end of the intake duct; that is, where the safe air is obtained. With this arrangement the ventilating duct system is kept under pressure. If the blower were located at some intermediate position along the intake duct, explosive gas might be sucked into the synchronous motor, in the event of a leak.

Special Enclosures

Where full enclosures are not warranted but brush sparking must be confined, enclosures for collector rings and direct-connected exciters frequently are used. These enclosures are neither gas-tight nor explosion resisting. However, when fresh air is piped to the enclosure under positive pressure from a blower started in advance of the motor, the chance of explosive gases reaching the rings or commutator is minimized.

EFFECT OF ENCLOSURES UPON TEMPERATURE RISE

Protective construction of motors restricts the ventilation somewhat, and thus affects temperature rise.

Standard induction motors have Class A insulation and are normally rated 40-degree C. rise, in an ambient temperature not over 40 degrees C. and at an altitude not over 3300 ft. A 10-degree C. service factor is always used on general-purpose induction motors to permit flexibility of operation. This allows a 40-degree C. rise motor with open or drip-proof construction to carry an overload of 15% continuously without a temperature rise that would be unduly damaging to the insulation. The temperature rise of splashproof motors is 50 degrees C. The 10-degree C. service factor, allowing for a safe continuous overload of 15%, does not apply to splashproof motors.

Enclosed, self-ventilated and en-

COMPARATIVE PRICES OF PROTECTED MOTORS

TYPE	COMPARATIVE COST—PER CENT Based on 100 for open type
OPEN	100
DRIP-PROOF	100-120
SPLASHPROOF	115-135
ENCLOSED, SELF-VENTILATED	115-140 (ducts not included)
ENCLOSED, SEPARATELY VENTILATED	103-125 (ducts and fan not included)
EXPLOSION-PROOF	200 Approx. (depends on application)

closed, and separately ventilated induction motors provided with an adequate volume of ventilating air will have the same temperature rise as open-type machines.

With the exception of low-speed designs, synchronous motors of the open type have ratings similar to those of the open - type induction motor. Open-type, low-speed synchronous motors commonly are rated 50-degree C. rise, without a 15% overload feature. Low-speed, 40-degree C. rise, open-type, synchronous motors having the 15% overload feature are available at a small increase in price.

Drip-proof high-speed synchronous motors are standard with the 40-degree C. rise. Low-speed machines of the same construction are standard with a 50-degree C. rise.

All splashproof synchronous motors are standard with a 50-degree C. rise, and without the 15% overload feature. Therefore, care must be taken not to locate these motors in an ambient temperature exceeding 40 degrees C. For higher ambients, a motor with a lower temperature rise or Class B insulation should be chosen. Enclosed synchronous motors, if provided with an adequate volume of ventilating air, will have the same temperature rise as the open type.

Taking temperature readings of motors with protective construction presents some special problems. Normally the thermometer is inserted through the oil ring inspection hole and the bulb is placed in contact with the babbitt of the bearing. Care must be taken not to touch the bulb to the shaft.

To take the temperature of a motor with antifriction bearings, the thermometer is placed on the bearing housing or bracket and packed in putty.

Enclosed motors are, of course, given a temperature test before shipment. Because of the restricted space, it is difficult to perform this test after installation. However, with some types of enclosure, it may be possible to get a thermometer inside and read the temperature with a flashlight. Also, it is possible to test the temperature relay outside the motor. The relay can then be replaced in the bearing.

What to Do About Rival Left-and Right-Wing Unions

IF YOU HAVE A CONTRACT with one of the 11 left-wing unions now fighting with right-wing elements in CIO, be on the alert for trouble from now on. That's because CIO is finally determined to clean house—which means it is going to set up rival right-wing unions as it gets rid of the left-wingers.

Take the Electrical Workers. Long known for its pro-Communist leanings, the big UEW jumped the gun at the CIO convention just before being expelled. The first thing CIO did was to set up a rival International Union of Electrical, Radio, and Machine Workers (IUEW).

The resulting squabble over control of local unions has already put many employers right in the middle. Let's take a look at some of the problems you can run into such situations.

Your biggest puzzler will be what to do about conflicting claims from rival groups, both saying the contract is theirs. Many employers have already gone on record that they are going to remain strictly neutral. Reasoning is that there is doubt as to who really represents the workers, that the rivals should go to the National Labor Relations Board to settle the dispute. Some employers (like General Electric) say they signed contracts with UEW, not IUEW, and that those contracts will be honored until the rival union proves its legal right to represent the workers.

Where you have a check-off clause in your contract, the question of who gets the check-off money is also a sticker. Get good legal advice before giving the money to anyone. Don't forget—if you give the money to the "wrong" group, you may eventually have to pony up twice.

For practical, everyday operating reasons, however, the worst problem is what to do about daily grievances.

Again the answer isn't simple. It sounds logical to settle grievances wherever you find them. Most firms do that anyway. On the other hand, if you recognize two groups of shop stewards, you can easily throw your plant into an uproar. You can also be cited by NLRB for unfair labor practice. But that isn't as bad as it sounds. NLRB has to investigate such charges, and that might clear the air as to who is the legal representative of the workers.

To employers caught in left- versus right-wing union arguments, here is one source of comfort: The argument is between the unions. Unless you are very sure of what you're doing, make them fight it out.

EYE-CATCHING POSTERS ARE USED IN AMERICAN TYPE FOUNDERS' DRIVE TO MAKE WORKERS QUALITY-CONSCIOUS

Posters Teach "Customer Is Boss"

THE CUSTOMER IS BOSS AGAIN. That is the theme of posters put up in plants of American Type Founders, Inc. The posters are the spearhead of a campaign to tighten production, cost, and quality standards.

Illustrated placards are designed to appeal to employees' interest and loyalty. Cartoons show the customer peering over the worker's shoulder, congratulating him on attainment of high efficiency, or searching for quality at low cost. While artwork varies slightly to fit different products made in individual plants, the same general theme appears throughout.

Effectiveness of the posters is boosted by briefing plant supervisors before posting, and by tying cartoons in with specific quality, suggestion, and employee-training programs.

The aim of the campaign is to convince employees and supervisors once and for all that the day of a seemingly inexhaustible backlog of orders is past—permanently. Meetings, conferences, bulletins, and specialized drives supplement the posters. Company officials feel that this comprehensive program is necessary to make, and keep, employees quality-conscious. They plan to keep it running for at least six months, maybe longer.

1 Members of visiting British "Productivity Team" have features of giant grab explained to them by Donald Pennock, Carrier's Factory Engineer in charge of materials handling. Grab is suspended from crane.

Camera Tour: Carrier Corp.

Getting Ideas for Good Handling

"WHAT PLANTS can show a group of specialists in materials handling from England the newest and best in American materials handling?"

A representative of the Economic Cooperation Administration (ECA) put that question to FACTORY's editors and a group from the American Society of Mechanical Engineers. ECA was planning a tour by another "Specialist Team" of the Anglo-American Council on Productivity.

A unanimous choice for inclusion in the team's itinerary was the Thompson Road plant of the Carrier Corporation, located just outside Syracuse, N. Y.

GUEST AND HOST: British team leader with corporation founder

FACTORY's editors had visited this plant before, knew that Carrier was doing much in the way of materials handling that would be of interest to our own plant operating men as well as to the visitors.

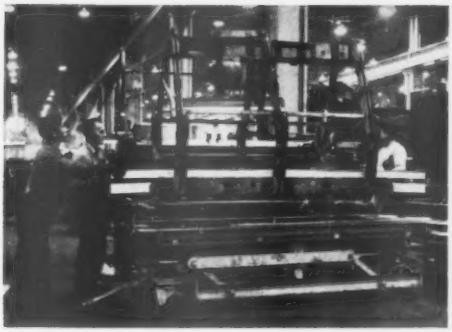
So when the Britishers called at the Carrier plant, FACTORY went along to make a photographic record of the inspection tour.

Dr. Willis Carrier, air conditioning pioneer and founder of the corporation, was on hand to greet Alfred Roebuck, British team leader, and members of his group. Then Donald C. Pennock, Carrier's materials handling specialist, took over as host of the tour.

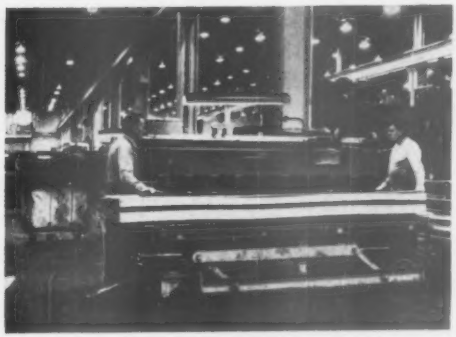
He pointed out how Carrier is doing its handling job, why it is being done the way it is, and how improved handling methods and equipment are bringing lower production costs.

Come along with the team and see how visitors at Carrier are "Getting Ideas for Good Handling."

Moving Sheet Steel From Storage to Presses



2 Crane moves sheets of steel from incoming storage to shears. Here sheets are deposited by grab on a positioning table, ready for the trimming operation.



3 Positioning table at shear hydraulically maintains top of stack of sheets at proper level for feeding, thus eliminating need for workers to lift heavy sheets.

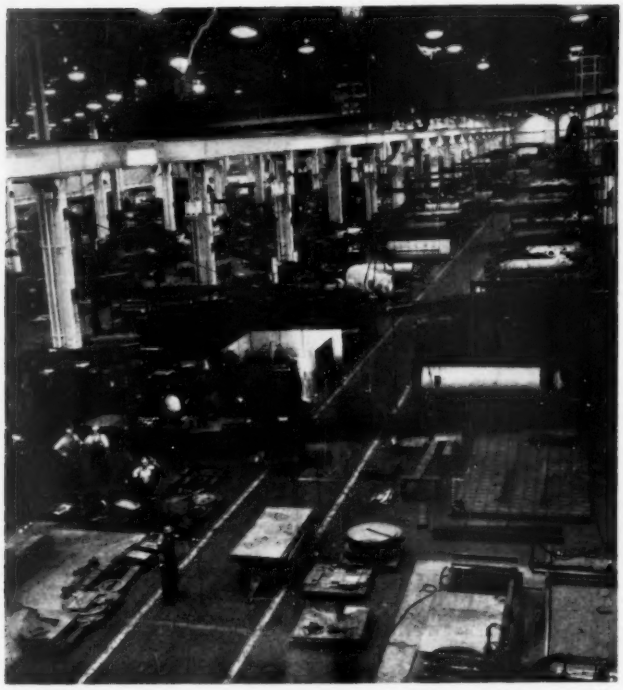
4 Roller leveler cleans and stress-relieves sheets, drops them on steel pallet. Sides of "bin" guide stacking. Pallet is removed from open end on right.

5 One of the British visitors is a fork truck manufacturer. When he completes his "dry run," truck will move sheets from roller leveler to heavy presses.

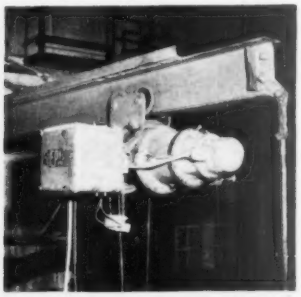
6 Combination of portable roller skate and accordion roller conveyors feeds stampings from one press to another. Host Pennock (center, pointing) explains that setups are temporary, can be moved in a matter of minutes to accommodate any desired series of presses. Britishers made notes on tour, dictated more at hotel.

Continued on next page

Cranes Do a Big Handling Job Inside Carrier Plant



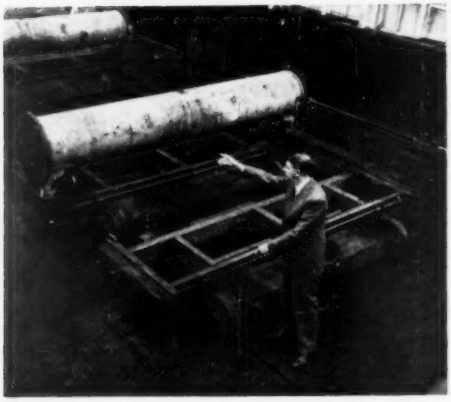
7 Visitors got unobstructed view of one of the ten aisles that run the length of the 13¼-acre plant. In top foreground is one of two overhead cranes serving aisle. It has both 10-ton and 30-ton hoists.



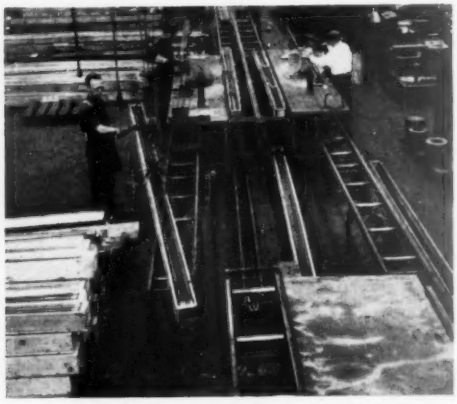
8 Most jib cranes have transformer on hoist motor, permit travel at 5 to 20 fpm, for precision spotting.

9 Special grab on hoist is placed over edge of steel sheet, enables one man to move 3-ton sheets.

British See Assembly . . . Parts Production . . .



11 Condenser tubes are moved through soldering by jib hoist and roller conveyor. Jibs swing through 180-deg. arc, so four serve each of the 24 60-ft. bays.



12 Across aisle, condenser begins to take shape on dolly. Host Pennock indicates chain and sprocket used to move the dolly down the production line.

Outdoors, Crane Teams Up With Tractor-Trailers

10 Outside craneways run entire length of the plant. If you keep your eye on the steel and not on the crane, handling several tons at a crack is simple.

. . . and Tool Crib

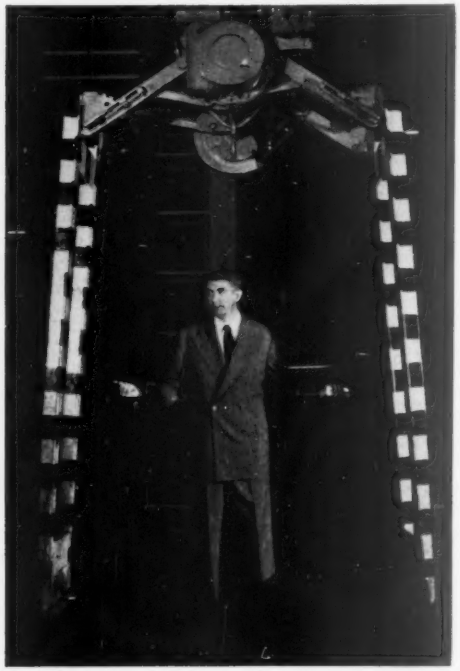
13 On the way to lunch, members of the team stop off to inspect master tool crib. Good lighting, special bins, insure fast delivery of perfect tools.

14 Washroom in factory area is just as clean and a lot more spacious than those out in the "front office." Besides, this one is closer to the cafeteria.

Continued on next page

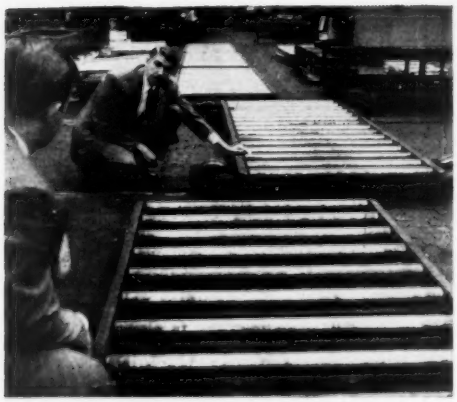
Carrier Solves Problem of Handling Parts Racks by

15 Large stamped parts are kept in special racks. Host Pennock explains how racks are designed to be nested. Top sections of racks are removable.



16 Here's the giant grab used for handling the loaded racks, either singly or two high. Operator in the crane above has opened it on signal.

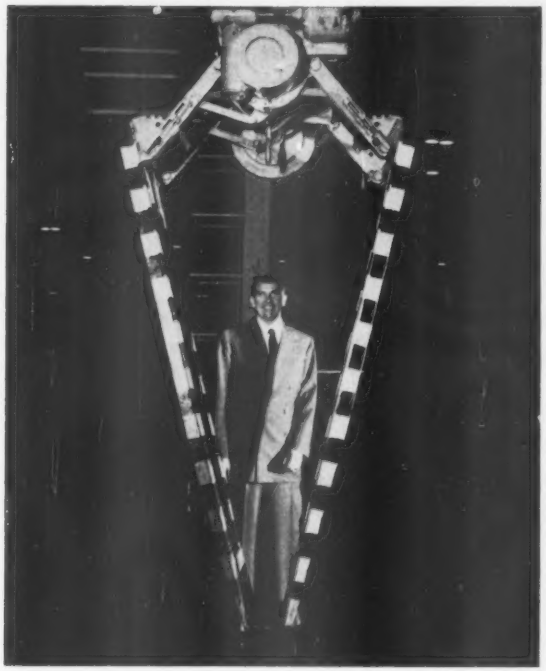
Mechanized Equipment for Moving Finished Units



19 Transverse section of roller conveyor permits assembled units to be transferred from one line to another. Section can be lifted by overhead crane.

20 At loading dock, magnesium bridge plate is placed by fork truck. But 10,000 lb. capacity plate is light enough for two men if fork truck is not handy.

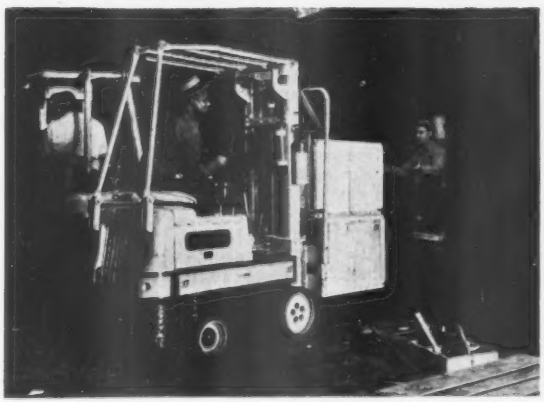
Using Crane With Huge Grab



17 Claws of grab close sufficiently to permit handling of small loads. Friction clutch in grab mechanism adjusts pressure of claws to weight of the load.

18 Crane operator maneuvers two loaded racks into position for storage. Grab is also used for handling pallets and skid boxes, which are same basic size.

From Production to Shipping



21 Smaller fork trucks are used for most freight car loading. These trucks can enter the car and maneuver freely to spot the load.

22 Host Pennock bids good-by to ECA Project Manager Couchman, as Team Leader Roebuck and Member McDonald wait to express thanks.

HOW MANY FOOT-CANDLES* OF LIGHT?

Use 50 foot-candles where the seeing task is **DIFFICULT,** involving
- a. Discrimination of fine details
- b. Poor contrast
- c. Long periods of time

Such as:
- Auditing and accounting
- Business machine operation
- Transcribing and tabulation
- Drafting and designing

Use 30 foot-candles where the seeing task is **ORDINARY,** involving
- a. Discrimination of moderately fine details
- b. Better than average contrast
- c. Intermittent periods of time

Such as:
- General office work (except tasks listed as *difficult*)
- Conference rooms
- Active file rooms

Use 10 foot-candles when the seeing task is **CASUAL,** such as:
- Inactive file rooms
- Reception rooms
- Stairways
- Washrooms and other service areas

Use 5 foot-candles when the seeing task is **SIMPLE,** such as:
- Hallways and corridors
- Passageways

Source: I. E. S. Recommended Practice of Office Lighting

$$\text{*Foot-candles} = \frac{\text{lamp lumens} \times \text{coefficient of utilization} \times \text{maintenance factor}}{\text{area per luminaire}}$$

1 **Recommended values in this table apply to illumination maintained on the work. Since it usually is not uniform when luminaires are symmetrically spaced, consider this factor when locating them or the desks**

How to Get Light That's Right

WILLIAM H. KAHLER • LIGHTING ENGINEER, LIGHTING DIVISION, WESTINGHOUSE ELECTRIC CORPORATION, CLEVELAND

IF YOU HAVE NOT CHECKED your plant office lighting recently, it may pay well to do so. Most office employees do exacting work that requires high-quality lighting. If they do not have it, headaches, eyestrain, and mistakes are likely to be high.

Remember, too, that more foot-candles *(quantity)* do not always result in better lighting. There are five other factors that determine quality. They, too, must be considered if you are to obtain balanced control of visibility, comfort, and general psychological reaction.

The term "offices" in this article refers to multi-desk factory office areas where large or small groups of people work.

I. INSTALL ENOUGH LIGHT

Your selection of the desired quantity of illumination is dictated by size of task, contrast, and type of work—whether intermittent or prolonged. Balanced against these task requirements are installation limitations and economy. Practical determination of quantity of illumination requires a knowledge of scientific data concerning the seeing process and an understanding of up-to-date illuminating engineering techniques. Use values in the table as your guide.

Average illumination is dependent upon luminaire distribution and efficiency, reflection factors of the ceilings and walls, and maintenance of the equipment. Direct luminaires provide the highest utilization of light. Indirect luminaires, which depend upon redirection of light from the ceiling, have the lowest utilization of light.

Illumination is directly proportional to the efficiency of the luminaire. Specify luminaires with maximum efficiency commensurate with certain limiting factors that affect the quality of illumination.

It is necessary to estimate the probable average maintenance condition of the luminaire. Then select a maintenance factor that will provide the desired illumination in service. The I.E.S. Lighting Handbook gives maintenance factors for the various types of luminaires.

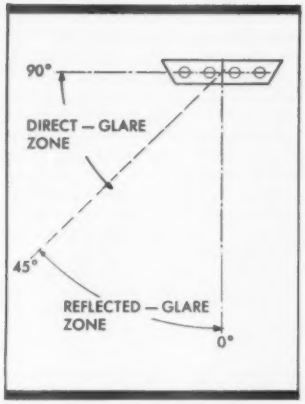
A good maintenance factor is suggested where the atmosphere is clean, luminaires are frequently maintained, and lamps are promptly replaced.

Use medium maintenance factor where medium dirt conditions exist in the atmosphere, but luminaires are cleaned regularly and lamps promptly replaced.

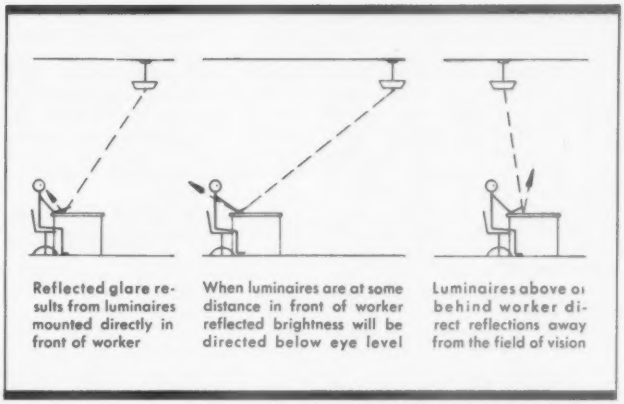
Use a poor maintenance factor where the atmosphere is dirty and equipment is poorly maintained.

II. DISTRIBUTE IT RIGHT

The recommended values in the table apply to illumination on the work. Illumination actually is nonuniform in a typical lighting system with luminaires symmetrically spaced. The high points usually are in the center of the room. Lowest values are along the walls and at the corners. If activity around the edge of the room does not involve critical seeing, such distribution may be satisfactory. Where desks are located against the wall you will have to correct this nonuniformity. In a typical continuous-row installation, illumination drops off near the wall. You can improve this condition by breaking the con-



2 High brightness causes direct or reflected glare in the zones shown


Reflected glare results from luminaires mounted directly in front of worker
When luminaires are at some distance in front of worker reflected brightness will be directed below eye level
Luminaires above or behind worker direct reflections away from the field of vision

3 Reflected glare can be avoided by properly locating luminaires or desks, to make sure that reflection is below eye level or away from eyes

for Your Factory Offices

tinuous row to move luminaires closer to the wall.

Uniformity of distribution between luminaires is controlled by the ratio of spacing to mounting height. Many manufacturers specify a maximum spacing-mounting height ratio. Don't exceed these ratios if you want uniformity. Specific manufacturers' instructions should be followed in this respect. It is not enough to say that the maximum spacing-mounting height ratio of a certain general type of luminaire is a fixed value.

III. ELIMINATE THE SHADOWS

Harsh shadows in an office are annoying. They often cause fatigue and dissatisfaction with the lighting system. It is not possible or desirable to eliminate shadows completely, but take care to prevent dense shadows. Indirect lighting produces extremely soft shadows; direct lighting may cause harsh shadows.

Direct-indirect types of fluorescent luminaires that direct approximately 50% of the light output upward and 50% downward usually meet the shadow requirements for an office. The upward component of light, redirected from the ceiling, is well diffused and is effective in minimizing shadows. For drafting rooms, shadow elimination is even more important. Therefore, greater diffusion of light is required. The semi-indirect type of fluorescent lighting is particularly desirable for drafting room lighting, from the standpoint of minimizing shadows.

With continuous-row, direct fluorescent luminaires, line shadows may appear parallel to the rows. Spacing between rows considerably less than the maximum for uniform distribution will reduce these shadows. When troffers are used in drafting rooms, spacings of 2 to 4 feet are considered good practice.

Another way to reduce shadows with direct lighting is to run the luminaires in two directions, to form a grid layout. This arrangement will practically eliminate the line shadows created by parallel rows of luminaires.

A compromise is the diagonal arrangement used in many drafting rooms to minimize shadows.

IV. GUARD AGAINST GLARE

Glare is the worst offender to comfortable seeing. It is usually considered in two forms: *direct* glare from the luminaires, and *reflected* glare from the seeing task or work surface. Luminaires more than 45 degrees above a horizontal line of sight normally are not in view. Hence light from a source more than 45 degrees above the worker is seen only as reflected from the work surface. Luminaires within the 45-deg. field of vision or farther forward from the worker produce direct glare.

Be sure luminaires are well shielded in the zone from the horizontal to an angle of 30 to 45 degrees below horizontal (Figure 2).

To reduce direct glare:

1. Use luminaires with low brightness on surfaces that appear in normal field of view.

2. Minimize the areas of high brightness exposed in the field of vision.

3. Install luminaires as high as practicable, with due consideration for other design factors.

4. Use light-colored surfaces as background for the luminaires, to reduce contrast.

The direction in which fluorescent luminaires run determines the amount of exposed area of brightness that is seen. Recessed troffers that are well shielded in a direction normal to the lamp are best installed across the usual line of

sight. With luminaires having luminous side panels, such as direct-indirect types, minimum glare is obtained with rows of units parallel to the line of sight. Where such units are run across the line of sight, the brightness of the side panels may become annoying, since the glare effect is cumulative. This is particularly true in large rooms.

Reflected glare from units above the field of vision is frequently the cause of considerable discomfort. It reduces seeing ability because light rays are reflected directly from the seeing task in the line of vision. Usually it is impossible to dodge reflected glare because the position of the worker in relation to the seeing task is fixed rather closely.

Reflected glare is a function of:

1. Direct luminaire brightness, particularly in the 0- to 45-deg. zone.

2. Brightness of the seeing task, which is dependent upon the reflection factor of the seeing task and the footcandles. Usually only the foot-candles can be altered.

3. Reflecting characteristics of the task and work surface.

Brightness of the source or luminaire in the 0- to 45-deg. zone should be kept to a minimum to eliminate or minimize reflected glare. Also, keep the candlepower at the lower angles as low as practicable. Louvers reduce direct glare, but have little effect on reflected glare because they have practically no shielding effect below 45 degrees. To minimize luminaire brightness and candlepower in the 0- to 45-deg. zone, a diffusing medium such as glass or plastic is required.

The task brightness can be increased, of course, by increasing the illumination level. Tests have shown that, for the same type of luminaire, reflected glare was reduced noticeably when illumination was increased from 40 to 80 foot-candles. Certain ratios have been established as a result of these tests. For example:

Brightness of the source in the direct-glare zone should not exceed brightness of the work surface. Both areas are in the direct field of vision.

Brightness of the source in the reflected-glare zone should be no more than 30 times higher than brightness of the source in the direct-glare zone. That holds even though the source in the reflected-glare zone is not in the normal field of vision.

The most annoying reflected glare is caused by a glossy surface of the task or work area. Desk tops of dark, polished wood or glass produce annoying reflections that can be eliminated by a light-colored, nonglossy surface. A light-colored material minimizes reflected glare. Also it reduces the brightness ratio between the task and its immediate surroundings, and thus improves seeing comfort. The I.E.S. Recommended Practice of Office Lighting recommends that desk tops have a nonglossy surface with a 35% reflection factor.

Another method of reducing or eliminating reflected glare is to orient the desks or luminaires so that reflected brightness will be directed away from the worker. This technique has been successfully used in private office lighting. It can be used to some extent in large offices when the principle is fully understood.

You need only remember the law of specular reflection—the angle of reflectance equals the angle of incidence. From Figure 3 it can be seen that a luminaire located directly in front of a worker is a potential source of reflected glare. If the luminaire is behind or directly above the worker, the reflection will be directed away. Also, luminaires at some distance in front of the worker will not be annoying, since reflections are below eye level.

V. CONSIDER ATTRACTIVENESS

The over-all appearance of an office interior affects the mental attitude of the workers. An attractive, pleasing interior is often a stimulant to better morale and general satisfaction. A lighting system is not adequate unless it is acceptable and pleasing from the appearance standpoint. Most office lighting equipment is utilitarian in design, but it should be installed so as to be unobtrusive and neat.

Wherever possible, run fluorescent luminaires in continuous rows. This practice reduces the effect of a number of luminaires in the room. Where units are installed as individual fixtures, the appearance is often cluttered. If it is not possible to install continuous rows, you may arrange luminaires in groups of two, three, or four to reduce the apparent number.

The mounting height of the equipment also affects the appearance. Luminaires mounted close to the ceiling have a better appearance than units with long stems. A desirable mounting height, however, depends upon the room proportions. In a small room with high ceiling, appearance is better with relatively long suspension stems. In a large room with a low ceiling, mount luminaires as close to the ceiling as practicable from the standpoint of good illumination results.

A sketch to scale of a section through the office will help you determine the satisfactory mounting height.

Decorative materials and colors also play an important role in the efficiency of the lighting system, and in the general appearance of the interior. Reflection factors of these materials are important in relation to the efficiency and effectiveness of the lighting system. The I.E.S. Recommended Practice gives the following approximate reflection factors for office interiors:

Surface	Reflection Factor
Ceilings	85%
Walls	60%
Desk tops	35%
Furniture	35%
Floors	30%

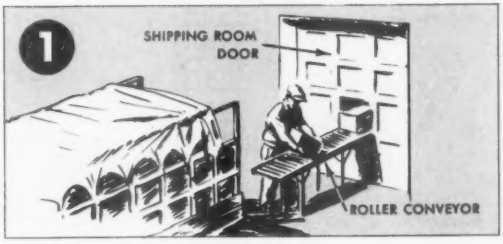
Luminaires recessed flush with the ceiling are usually best from an appearance standpoint.

Colors and textures of the decorative materials must be carefully selected, to make the interior pleasing from a psychological standpoint. A certain color or color combination may be particularly pleasing under one type of illumination, but unattractive under another type. Color combinations, therefore, should be selected under the type of lighting to be used. For large offices, select color combinations that have been tried and found satisfactory. Many combinations can be found that are both pleasing and attractive.

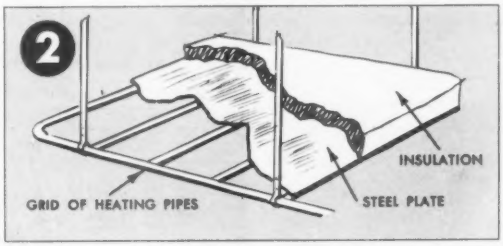
Strong colors are more difficult to use than soft, gray colors. Accents of strong colors, however, are often effective in adding life to an otherwise unattractive dull color combination. When decorating any office, rely upon past experience with certain color combinations, or get advice from one experienced and trained in color selection and decorating.

Four Ways to Lick Cold Drafts

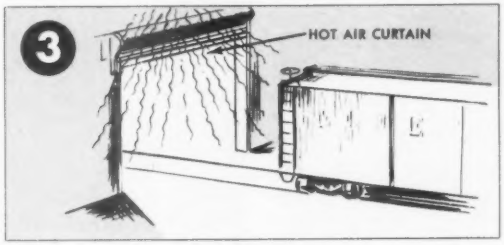
Drafts make workers unhappy, heating bills high. Some practical answers to the problem are shown here



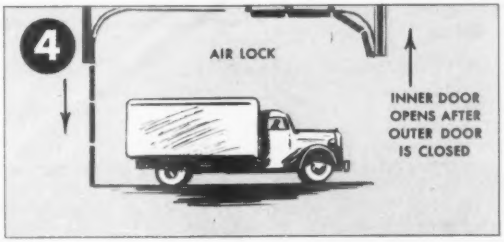
SMALL HATCH in the main shipping door solved the draft problem at Stephano Brothers, Philadelphia. Cartons of cigarettes are fed to the hatch by belt conveyor, then ride down an outside roller conveyor to the truck. Formerly the large door stood open for long periods of time while trucks were being loaded, making the shipping room a very uncomfortable place for men to work in winter.



OVERHEAD SPOT PANEL is used effectively in several places at Bell & Gosset Company, Morton Grove, Ill. Process exhaust units cause strong drafts, producing regional cold spots. Shown here, directly above such a spot, is a 4x8-ft. grid of heating pipes. A steel plate rests on the pipes, polished side down, with a layer of insulation above it. This radiant panel heating eliminates the cold spot.



HOT AIR CURTAIN guards rail entrance to Ivanhoe Press Building, Perfection Stove Company, Cleveland. It's used, on the average, twice a day. The door is roller type, 16 feet wide and 21 feet high. Opening the door automatically turns on overhead down-blast unit heater with capacity of 1,200,000 Btu. per hour. Curtain of hot air cannot easily be penetrated by cold air from the outside.



AIR LOCKS, each used by 3 to 6 trucks per hour, have proved very economical at all trucking docks at Perfection Stove. On signal from driver, worker in plant opens outside door, closes it after truck, then opens inner door. Truck passes through in 1½ to 3 minutes. Unit heater with a capacity of 145,000 Btu. per hour heats lock area. Even in winter, dockmen work comfortably in shirt sleeves.

SIDEWAY CONVEYOR

Parallel pallet conveyors carry buses sideways through painting and fitting operations, save time and space

ARTHUR W. WRAGBY · SUPERINTENDENT OF COACH DIVISION
GMC TRUCK & COACH DIVISION, PONTIAC, MICH.

DID YOU EVER SEE work move down a conveyor line sideways? It does at our Coach Division plant. Many observers consider the method revolutionary. When it was installed, production went up 50%. Space requirements went down by the same amount. Productive labor hours needed for each coach were reduced by better than 40%. And the workers' jobs became much easier.

The chief cause of these improvements is a pallet conveyor that takes coaches fresh from the assembly line, moves them side-by-side through painting and up-fitting operations. By moving coaches sideways instead of end-to-end, it's possible to work on 53 of them at the same time. The conveyor line holds 33 in the paint department, 20 more in the up-fitting department.

But other things contribute to this low-cost operation—power-operated scaffolds, for example. They are used by men who sand the bodies and apply masking tape preparatory to painting. The scaffolds move up or down, providing the best working height at all times. This method is a big improvement over the six ordinary scaffolds we used formerly. Employees spent a lot of time and effort climbing up and down while doing their jobs.

Paint spray men, too, work from electrically driven platforms that run the whole length of the coach. The touch of a button lowers or raises them to any desired height, or moves them sideways. These platforms carry their own curtain of water to wash away excess paint and fumes. Glass-enclosed fluorescent fixtures give the paint sprayers plenty of light.

Separate stalls hold a coach during painting or baking operations. Each stall has its own power-operated doors that can be opened or closed at will.

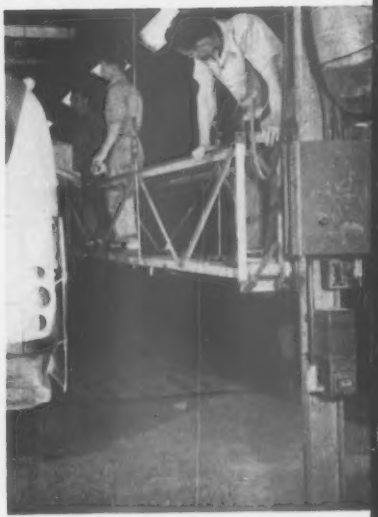
In the up-fitting department, an overhead rail conveyor holds power tools, shifts them from one operation to another as needed. Previously, employees had to plug a tool in at each operation. And tools were often hard to find. Both these factors resulted in wasted production time.

But back to the sideway pallet conveyor—employees call it the "caterpillar." There are two sections, 831 feet long, moving in parallel. The front wheels go on one, rear wheels on the other. The paint shop takes up 512 feet along the line, and the other 319 feet is used for final up-fitting operations. Individual pallets are flat steel plates, 38 inches long and 21 inches wide. Buses are spaced 15 feet apart on the line to give employees plenty of working space.

CONVEYOR makes 32 stops in paint department, moves on into up-fitting department

The layout of the conveyor line in the paint department is shown in the table above. There are six booths along the line for the following operations: metal clean; spot prime; spray surfacer; and first, second, and third color sprays. Repair and touch-up men have a separate area. Five sets of paint baking ovens are spaced in between the

TURNTABLE receives coaches from body shop, transfers them to second turntable. From there they are moved onto parallel pallet sideway conveyor at its first station in the paint department



MASKING is easy when crew uses power-operated scaffold to reach all work areas conveniently

PAINTING is done from spray booths that travel length of coach, move up and down

BAKING is stopped and doors are opened automatically when the conveyor starts to move

CONTROL panel regulates conveyor movement and all other powered equipment

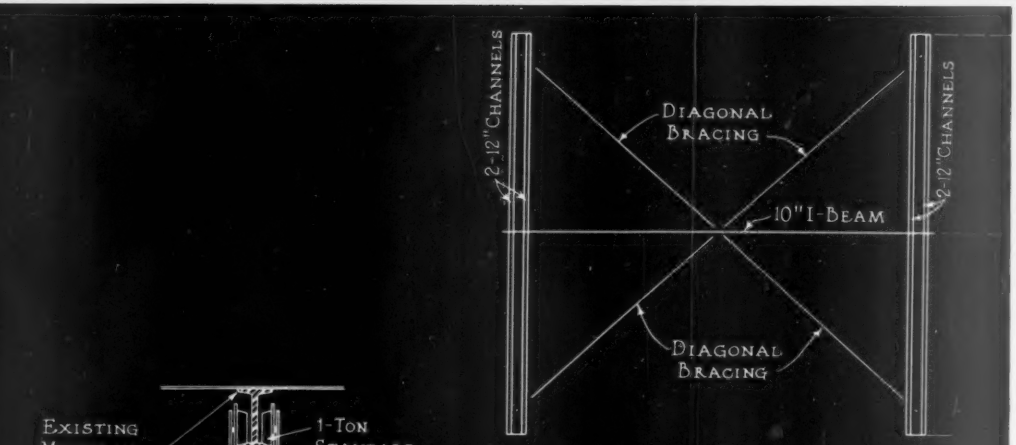
spray booth sections. Each set contains three separate ovens for different stages of heat. They reach full heat—180 degrees—within five minutes after the doors are closed. An automatic device shuts off the heat as soon as the doors open.

Periodically we move the whole line forward one station. With the old end-to-end system, this move took 15 minutes; now it takes three.

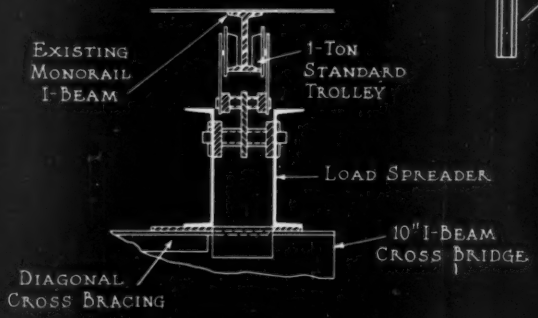
A panel in the paint shop controls the system. Warning lights on the panel show the positions of stall doors, scaffolds, and spray platforms. A siren goes off three minutes before each move. But the conveyor can't move until all of the equipment is out of the way.

The new conveyor system gives us many advantages. For instance, better labor control is provided by moving the line on schedule from station to station. Distribution of parts to each work station is simplified. We have eliminated handling of different paints by piping each directly to its respective area.

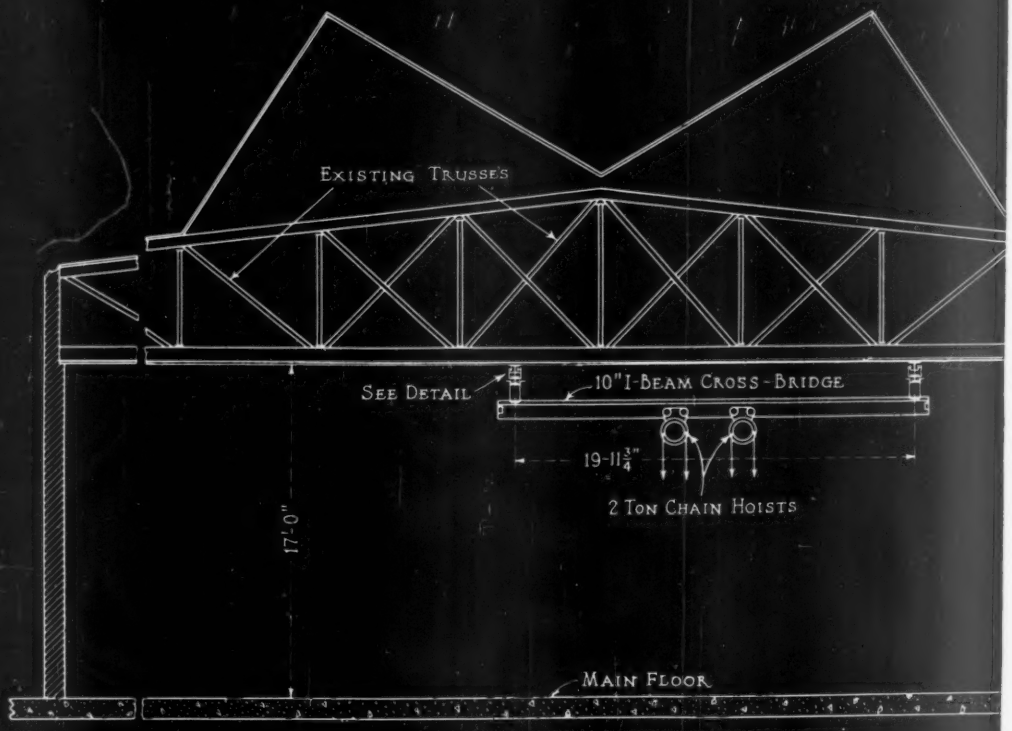
Not so obvious, but important just the same, are these other results: improved housekeeping, by having a place for everything and everything in its place; and more effective supervision because there is better visual control over the entire area.



Plan



Detail



Transverse Section

How We Made Our Roof Trusses Carry More Load

PROBLEM: to hang two 2-ton hoists on roof trusses designed to carry 1-ton loads

SOLUTION: *spread the load.* It was simpler and cheaper than strengthening trusses

G. S. STRINGER • CHIEF PLANT ENGINEER, FORD INSTRUMENT COMPANY DIVISION OF THE SPERRY CORPORATION LONG ISLAND CITY, N. Y.

CHANGES IN PRODUCT or layout may sometimes give you the problem we faced recently. That problem was to hang two 2-ton hoists on roof trusses designed for 1-ton loads. It was eventually solved by a simple and inexpensive method of spreading the load.

The building in which this requirement arose has a sawtooth roof supported on steel trusses. These trusses were designed to carry a 1-ton load on each of two monorails. They run the length of the building and span the distance between the trusses.

Some years ago the building was remodeled and adapted for light, precision manufacturing operations. The alterations involved the installation of air conditioning ducts above the roof trusses. Also, a false ceiling was put in, suspended from the trusses. The existing monorails were adequate for the loads.

Later on the manufacture and assembly of rotary printing presses was undertaken. This involves the assembly of large, heavy parts and moving them as complete units. Such units could not be handled by the 1-ton monorails without costly rigging. On the other hand, to strengthen the trusses and monorails sufficiently to handle the new loads would have been too expensive. The air conditioning ducts and false ceiling certainly would have complicated matters.

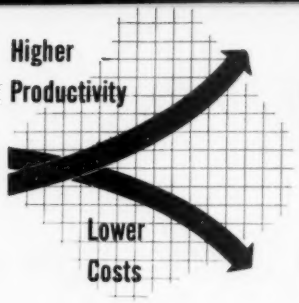
Therefore, the problem was attacked from the standpoint of spreading the concentrated load so that structural steel work and connections would not be loaded above the design specifications. Each point of the trusses and supports for the monorails was capable of carrying a load of 1 ton. If the concentrated load were broken up so that the reactions on the trusses did not exceed 1 ton, the supporting capacity would be equal to the sum of the reactions.

This principle was worked out by equipping each monorail with a load spreader, as shown on the opposite page. Each spreader is suspended from the monorail on 1-ton trolleys spaced 19 feet, 8½ inches, from center to center. That is the distance between trusses. The load spreaders in turn support a 10-in. I-beam crossbridge that is permanently attached to the under side of the spreaders at the center. In effect, this construction forms a small traveling crane. The weight of this unit was, of course, kept as low as consistent with its functions.

No matter what position the crane takes along the monorail I-beam, the reaction on any truss will not exceed 1 ton if the center loading of the bridge is restricted to 4 tons. A 4-ton lift was considered adequate for the assembly of the printing presses.

The crane gives much greater flexibility in the press assembly operations than two monorails of the same lifting capacity, since the bridge structure covers the floor area between the monorails.

THE EIGHTH



ARTICLE IN FACTORY'S

Provide the Best in

USE EVERY AVAILABLE MEANS of making your training more effective. That's Western Electric's approach to on-the-job instruction. Here's an example, showing ingenious use of visual aids to give learners full-time instruction without tying supervisors down. Learner pushes slides into position in small viewer at work place. Slides show job sequence, and also standardize work methods

Employee Training

► TRAINING AND OPERATING EFFICIENCY GO HAND IN HAND

Workers and supervisors *learn*, whether trained or not. If not properly trained, they learn by trial and error, from fellow-workers and shop stewards. To the practical operating executive, this means just one thing:

► YOU CAN'T AFFORD NOT TO TRAIN—AND TRAIN WELL

If you don't do it the right way, someone else will do it the wrong way for you

► TRAINING IS A BASIC MANAGEMENT JOB

It needs to be done day in and day out. It's the plant operating executive's only sure-fire way of building a work force that returns full value for every dollar invested in labor cost—that produces greater output at lower cost

M. J. MURPHY • ASSOCIATE EDITOR, FACTORY

1 *Determine Training Needs*

The secret of good training is to be on top of it all the time. That means knowing *just what* training is going on, and *how well* it is being done. It also means knowing *what else* is needed—and *by whom*.

None of these jobs is easy. Nor are there any simple formulas that you call on to help. The most practical approach is to make a personal survey, in general terms, of the plant as a whole. Then follow this up by getting superintendents and foremen to make divisional and departmental surveys in greater detail. You can make both of these jobs as formal and extensive as you desire. That will depend on how much paperwork you can tolerate, and on the size and complexity of your organization.

General plant survey. The purpose of a general survey is to form broad impressions, to gain perspective that will come in handy when considering details later. Here are some things to look for:

1. How much training is actually going on? There is usually a central record of formal classroom training, so you can check such courses easily. Find out what is taught, who teaches, who attends, and why the courses are being offered. Check up on conferences and meetings, too. Some will have little relation

Continued on next page

to training. For example, it isn't training when the "boss" says: "Cut down on costs—or else," and then stalks out in a chorus of "Yeses." Don't ignore this type of situation. It gives plenty of leads as to where corrective action is going to be needed.

The toughest job is finding out how much on-the-job training is done in individual departments. In a general survey, you will have to depend mainly on what supervisors tell you, and how their reports check with personal observation and other evidence.

2. How much interest is there in training? Talk with workers, foremen, superintendents, and executives. In a negative way, supervisory reactions can be most revealing. "I don't have time for that stuff" is usually a pretty accurate reflection of the opinions of the supervisor's *boss*. On the other hand, don't be too impressed by words alone when the response is enthusiastic. Look for some evidence of what has been done. Long experience has taught many supervisors that the easiest way to stop the "brass" from piling on more work is to talk generalities.

3. What do people think is needed? And what do they think is wrong in present practice? Sifted carefully, the answers to these questions often help you spot basic problems and real needs.

4. What do plant statistics suggest about present training activities and the need for improvement or change? Examine departmental production and scrap records. Occasionally they lead to apparently obvious solutions that have been long overlooked. Where there is a wage incentive plan, study bonus earnings records. And if time-studied standards are in use, departmental efficiency records will give clues as to how well trained and interested the workers are. Statistics on labor turnover, absenteeism, minor and major injuries, and grievances, for instance, may also provide good leads.

Obviously, a general survey has major limitations. It is quite satisfactory, however, for showing up the *extremes*—the very good and the very bad training situations. That alone makes it worth the small time-investment required. It will also give plenty of helpful evidence of where there is going to be trouble in selling training ideas later on.

2 *Select the Best Training Method*

INDIVIDUAL INSTRUCTION by craftsmen gets know-how across at Fisher Body Div., General Motors

GROUP INSTRUCTION is less costly and faster. Here Fisher Body apprentices are taught by foreman

There are only a few basic training methods. All have strong and weak points. Once these are understood, the problem of selecting the method best suited to local problems is relatively simple.

The various methods of training may be split into three groups.

INDIVIDUAL INSTRUCTION

On-the-job instruction. Here the trainee learns while he works. Explanation and instruction go on at the workplace; the worker immediately uses what he learns. This is the most common of all training methods. Estimates are that 75% of all industrial training is of this type. It is fast, interesting, and flexible. Ordinarily it requires no special facilities. On the negative side, it is expensive if training times are long, because it ties up the time of supervisors or instructors.

Off-the-job instruction. This takes the form of individual conferences or interviews, usually held in offices or other private places. It also is quite common, although often not considered a form of training. That

Detailed departmental survey. This type of survey puts flesh on the skeleton of information gathered in a general survey. The aim is to get down to brass tacks—to define specifically what training is needed by each worker and supervisor.

Even in the small plant, the departmental survey is not a one-man job. Each foreman goes over his own department. And each superintendent reviews the foremen who report to him. You can carry this as far up in the organization as you wish.

Tell the men making the survey exactly how to do it. Reassure them as to its purpose. Avoid giving any impression that reporting the need for a lot of training is something to be ashamed of. If that idea spreads, you won't get full cooperation.

Properly done, a detailed survey reveals what is needed to solve immediate, short-term troubles. Coupled with conclusions reached in a general survey, it also suggests what should be done to avoid long-term recurrences of training problems.

You don't need elaborate forms and procedures to make a survey. The simplest method is to get a list from each supervisor of all the men working for him, showing the skill and knowledge each needs to acquire to become more proficient on his present job. But for best results, more information than that is needed: Who are the promotional possibilities? What specific training do they need? Who are the "old-timers" (due to retire within the next five years, for example). What needs to be done to be sure of skilled replacements? What worker attitudes are problems? Which workers are most in need of training to change attitudes? Who are the static or apparently untrainable workers?

The answers to these questions, taken by job class and department, give a sharp picture of what to do. First time around, don't be surprised to discover a big pile of training problems.

If desired, special forms may be designed to help the men making detailed surveys to get the information in an orderly way. The elaborateness of the forms and procedures is a matter of personal preference. In general, however, it's a good rule to keep them as simple as possible.

---

is a mistake, because off-the-job training of this type is ideal for putting across key information so that it is clearly understood. It is especially good for induction training and attitude building. It can also be used at managerial levels. The main disadvantage has nothing to do with the principle, actually. It is that too many management people don't prepare properly for this type of instruction.

GROUP INSTRUCTION

Written material. The range is from simple notices, bulletins, or signs up to elaborate pamphlets, manuals, and texts. The common weakness is that you have no guarantee that written materials will be read. The solution is usually not to rely solely on what is written down, at least at the lower levels in the organization. At higher levels, major emphasis is put on this method.

Lectures. Often criticized as dry and passive, lectures can be highly effective if well planned and executed. Keep groups small to encourage participation in discussion and prevent passive attitudes from growing. The method is cheap compared with individual instruction. And it can be used for a great range of subjects.

Disadvantages include difficulty of being sure that everyone understands everything and lack of time to direct discussion at any one person's problems for very long. Discussion must be geared for the "average" person in the group. Most common use of lectures is to convey information about a specific subject. They are not at all practical for developing skills.

Conferences. These usually involve smaller groups than lectures, and aim at getting more active participation from the trainees. They are often used to mold attitudes, improve the judgments of conferees, and build up their skill in solving problems on their own. Conferences vary greatly in the amount of control exercised by the leader.

Some conferences are highly organized (like the TWI "packages"); the leader is constantly on the alert to steer discussion toward predetermined conclusions. These "directed conferences" offer a big contrast to "free conferences" where the leader does a minimum of steering. His main job is to set the stage for discussion and pitch in when things are lagging.

A good example of the "free conference" is the use of the "role-playing" technique that has become popular in the past few years. The leader sets up the problem, assigns the roles, and lets the conferees take over. His job then is to stay out until the time comes to sum up the conclusions that have been reached by the men themselves.

Conferences are excellent for developing supervisory skills in handling production and personnel problems requiring judgment and discretion. They are also useful for all levels in a company planning instruction to stimulate thinking about basic economic and business problems. Their main disadvantage is that they demand excellent leadership. Conference leading is a skill too many supervisors and executives have failed to develop. That in itself is a training problem.

COMBINED INSTRUCTION

Lecture-laboratory or lecture-shop courses. The advantages of on-the-job instruction are brought together with those of the lecture. The result is an excellent technique for thorough instruction. It is especially well adapted to teaching complex subjects.

Apprentice programs. Similar to the lecture-shop combination just discussed. The only important difference is that a production shop is substituted for a school shop.

Pre-supervisory and pre-executive training. These programs often call for a combination of lectures, group and individual conferences, and on-the-job training.

These combinations are good examples of how it is possible to integrate various methods that fit different subject matters. At the same time they give the whole training program variety and interest. That is an easily learned art, requiring mainly a reasonable understanding of the methods just analyzed.

Continued on next page

3 *Fix Responsibility for Training*

Generally speaking, you can use these two simple rules as a guide in fixing training responsibility:

1. *Decentralize* training as much as you can. All job-skill training should be kept as close as possible to line supervision. So much of this type of training is required that this is the only practical way to handle it routinely and effectively.

2. *Centralize* training only when you are sure the job can't be done well by the supervisor or at least within the department. Most special-purpose courses that cross departmental lines are centralized.

RESPONSIBILITY FOR WORKER TRAINING

Four general types of production-worker training need to be considered when deciding where to assign specific responsibility:

Basic job-skill training. The purpose is to get the output of new workers up to acceptable standards as fast as possible. For old workers, the aim is to correct bad work habits. Background information—the "why" of the job—must be taught, as well as skills.

Induction training. To get the worker off to a good start, tell him a lot about the company—its background, products, policies, benefits, and procedures. The aim is attitude-building, the arousing of interest, loyalty, and cooperation.

Special-purpose training. Aimed at improving job knowledge and attitudes in various ways, special-purpose training can cover almost anything. Safety, waste reduction, methods improvement, good housekeeping, blueprint reading, and shop mathematics are common topics. Analyses of annual reports, and courses in basic economics and business organization are less common but equally important.

Promotional training. The aim here is to develop the more promising workers for promotion to higher skilled jobs as openings arise.

When all these training activities are listed together, it becomes clear that the foreman can't possibly do all the training himself. He needs help. If the help that he gets does the training directly in the department he can logically be held responsible. But if the training is done elsewhere, direct supervision is harder, and responsibility will have to be shared with other departments.

RESPONSIBILITY FOR SUPERVISORY TRAINING

Three types of supervisory training need to be considered when deciding where responsibility should be fixed:

Training in key supervisory skills. The main elements of these basic skills were made famous during World War II by the Training-Within-Industry programs, which are still being carried by the TWI

4 *Adopt Sound Training Policies*

Effectiveness of training can be increased by sound, sensible policies. In addition, the cost and scope of training activities will be largely determined by policy decisions. Among the decisions that will have to be made are:

1. Shall employees be paid for time spent in training during working hours? This is largely a legal problem. The answer is *yes*—unless your attorney says *no*. Even then you should consider bad effects on worker morale that may arise from not paying. Certainly there is no excuse for not paying, legally or in terms of employee relations, if training is *compulsory*.

2. Shall trainees be paid for time spent in training after regular working hours? If your company is covered by the Fair Labor Standards Act, the employee must be paid if *required* to attend. Even where attendance is voluntary, the law also requires payment if productive work is done during training. Note that training after hours may also have to be paid for at overtime rates. In setting policy on after-hours training, *be sure to investigate the legal implications fully*. Check the Fair Labor Standards Act, the Wage-Hour Administrator's interpretative bulletins, and state laws. And don't forget your labor agreement, if you have one. Unions like to have their say about training policy.

Consider also the status of assistant foremen and foremen. If these men cannot be justifiably exempted from Wage-Hour regulations, they, too, may have to be paid at overtime rates for after-hours training.

3. Shall trainees be paid less than the minimum rates for skilled workers on the same jobs? If the training period is just a few days or perhaps a couple of weeks, the answer usually is *no*. In such cases it is pointless to recognize skill differences so small that a short training period will wipe them out. Where long training periods are necessary, it is entirely proper and logical to start trainees at lower rates. To cover such cases, special "learner scales" are often set up. This is regularly done for apprentices; the rates are expressed either as flat sums below the skilled rate, or as percentages of the skilled rate.

4. Should instructors be paid? Supervisors and other members of management should not be paid for teaching on-the-job or classroom courses during their regular work days. Teaching is a basic part of their work; they are already being paid for it in their salaries.

After hours, these same people may or may not be eligible for pay, depending on circumstances. A foreman who stays on after hours to coach a backward worker should not be paid. But the worker should. On the other hand, the same foreman might stay over to teach a course which he had been asked to give to a group of employees. Such work would be beyond his regular duties, and he should be paid. Non-supervisory part-time teachers giving courses after hours should always be paid.

5. How much should instructors be paid? One procedure is to pay the same rates as instructors in the local school system. This works out all right in most cases for after-hours teaching. It has the advantage that it systematizes the pay scale. But for production workers trained as on-the-job instructors, the usual solution is to pay an instructor's bonus. The bonus is either a percentage of the worker's base rate, or a flat

Foundation. They include skill in teaching, skill in leadership, and skill in improving work methods. These are the "universals" of good supervision.

Training in knowledge of company. Thorough understanding of policies, procedures, products, history, and organization of the company is essential if supervisors are to teach and direct their subordinates properly. Here are just a few of the subjects that need detailed coverage: contents of labor agreement, overtime rules, job evaluation plan, insurance and pension plans, wage incentive plan, time study program, production and inventory control systems, and budgetary policies and procedures.

Training in job knowledge and job skill. This does not mean that the supervisor must be an expert at doing every job in his department or division. He should, however, know how to do all jobs well enough to be able to teach them to others. And he should understand the technical details of the work well enough to be able to explain the *why* of the job as well as the *how*. He also needs such information to be able to judge and control the amount and quality of production. More advanced job knowledge often goes into highly technical engineering details.

The key questions are "Who should teach?" and "Where should training be given?"

As with production workers, the principle is that training is a line responsibility. The superintendent is responsible for training his foremen. The superintendent's boss is responsible for training *him*. To simplify the discussion, here the foreman-superintendent relationship will be used throughout, although the same reasoning applies to higher levels.

In practice, superintendents are doing training all the time. Through individual and group meetings with foremen, they analyze and discuss operating problems, answer questions, and give directions. Good as they are, such activities should be supplemented by specific, planned instruction and review of the skills and knowledge that every foreman needs.

Generally not too many foremen report to any one superintendent. It is reasonable, therefore, to insist that the superintendent take an active part in foreman training, even though he may not do all the teaching himself.

Because expert execution of training and uniformity of practice within a company are so important, the trend has been to provide staff help for instruction in key subjects. Written materials and conferences are handled by one or more trained persons (sometimes consultants). The superintendent's job in such cases is to participate right along with his foremen and to follow up so that the planned training objectives are actually attained.

---

sum over the base rate. Where incentive plans are in operation, make some arrangement to protect the instructor against loss of incentive earnings while he is teaching.

6. What shall be the scope of plant-conducted training? There is usually no problem as far as "bread and butter" training is concerned—on-the-job and classroom instruction directly related to immediate job needs. But how about advanced courses that are desirable but not essential, such as basic mathematics, engineering subjects, business English, and business management? Many firms encourage workers to take these courses outside the plant. Others offer them right on the premises. Both arrangements work well, but the second costs more. Your choice will depend on preference and budget.

What about cultural and "hobby" courses, such as languages, art, photography, and painting? Some companies offer such courses in the plant as an employee relations gesture, if there is sufficient interest to bring a large enough group together. Others do nothing, or confine themselves to having information on file as to where such courses are taught. Again, this is a matter of preference and budget. One thing is certain: Don't encourage courses of this type as long as the basic training program is weak. Settle more important matters first.

7. Shall college courses be subsidized? This question relates to the practice of paying part or all of tuition costs for college courses taken by employees. The practice is a desirable one if sensibly handled. Courses should be related reasonably to present or possible future work of employees concerned. Applicants should get approvals in advance; at least a passing grade should be required. Few firms pay less than half the tuition for successful completion of a course.

8. What kind of recognition shall successful trainees get? Usually diplomas or certificates are the answer. This apparently simple procedure is surprisingly popular with employees. They genuinely value documents certifying completion of training of any type. More elaborate procedures—such as dinners or cash awards—may be used, but not unless you have a good budget.

9. Shall cooperative training plans be encouraged? These are arrangements with colleges (rarely with high schools) to employ students on an alternate work-study basis. Students work for one or two months in the plant, and go to school for one or two months, throughout the year. Under the right conditions, cooperative training plans are an excellent means of recruiting well-trained younger men of tested merit. Do not expect to retain all the cooperative students you help train. If yours is a good plant, however, the number staying with you will be large.

10. Shall college trainee programs be adopted? The greatly expanded postwar college recruitment programs of many companies make this a pertinent question. Such training programs usually consist of closely directed job rotation, supplemented by conferences and lectures. The aim is to prepare the trainees for junior executive jobs in staff or line departments. This also is long-term training. Many programs have already fallen by the wayside because there was no long-term need for large-volume activity of this type. Don't undertake it unless the need for college-trained "young blood" from the outside is clearly proved.

Continued on next page

5 Select and Train Good Instructors

Full-time, professionally trained instructors are the best possible solution to teaching problems. These men are already competent trainers and can teach individuals or groups directly, as well as instruct others to do so. Those who can afford this kind of staff are fortunate.

The operating executive who has no such luck must turn to part-time instructors for his training program. On this basis he already has the whole force of supervisors on his teaching staff. They all have to be trained, and additional instructors will have to be chosen and trained to supplement supervisory efforts. In selecting this group, look for the following qualities:

1. From the technical standpoint, the instructor should be thoroughly informed—master of his trade, profession, or subject matter.

2. His general educational background should be equal to—preferably better than—that of his students.

3. For lecture and conference work, he should be a better-than-average conversational talker, with no annoying or distracting mannerisms.

4. He should be mature and intelligent enough so that he can see through subject-matter complexities and present basic principles clearly and simply.

5. He should really *want* to teach.

Where part-time instructors are used, they should be plant employees. This is an obvious requirement for on-the-job training. But even in the case of classroom instruction, it greatly simplifies the adminis-

6 Provide Good Facilities and Teaching Aids

The facilities needed for on-the-job teaching are ready-made; they are whatever the job regularly requires. The only essential training aid for this kind of teaching is a good job breakdown. There is no problem here.

Group instruction, however, isn't so simple. A well-equipped meeting room is the main requirement. The space itself should be well lighted and ventilated, reasonably quiet, and large enough to prevent overcrowding. Provide a large conference table or several smaller tables so that everyone has enough room for writing and note-taking. Most important of all, be sure the chairs are comfortable. For the instructor, the minimum requirements are a small table, a chair, a raised stand for his notes, an easel for charts and pictures, and a blackboard. If movies or slides are to be used, supply a screen and a projector stand.

Training facilities need not be elaborate or expensive. Neither should they be shabby or uncomfortable. If management shows its own disinterest in training

7 Follow Up and Report Training Progress

If what is taught isn't used, all the time and effort devoted to teaching will be wasted. For this reason, give follow-up considerable attention both during and after training.

During training, tests of accomplishment are used for checking on progress, as are ratings by the instructor or supervisor. The best test is one that measures directly how well the trainee can *use* what has been taught. In on-the-job instruction that is what happens constantly because the trainee proves his mastery by doing the actual job itself. In many other types of training, however, the problem is more complex. Some practical tests are possible, but the most common approach is the use of written tests. These tests are least objectionable if kept as objective as possible. This accounts for the popularity of true-false, completion, and multiple-choice tests.

Ratings by instructors and supervisors are often preferred to written tests. These ratings, if done without bias, are more likely to reveal the amount of transfer of knowledge or skill from the classroom to the work situation.

After training has been completed, continue your follow-up. But make it the direct responsibility of the supervisor, regardless of whether he did the actual teaching. One good method to guarantee regular follow-up is to devise a simple system of "reminder slips" which a clerk can send to the supervisor, sug-

8 Sell the Training Program

Disinterest is the greatest barrier to successful training. It is especially serious where training is heavily decentralized. Training must therefore be sold throughout the company to all operating levels. Here are some "sales ideas" that will help:

1. Make sure everyone understands the objectives of training. Once training needs are known, practical down-to-earth objectives can be readily stated. A clear statement of these objectives gives both worker and manager a sound idea of just what each training activity is going to accomplish.

Furthermore, you can't evaluate the *success* of training unless some specific goal has been set up. A statement of objectives gives the basis for later measurement of progress.

2. Make sure as many people as possible feel a sense of participation in planning. One of the best ways to do this is to ask for advice and help all over the company. Make use of advisory and "steering" committees in working up training plans. Circulate proposals, and ask for suggestions and comments. Give credit freely.

tration and control of the program. Furthermore, use of in-plant instructors keeps training more down-to-earth, and closer to the trainees' operating problems. This plan also helps develop the instructors as candidates for possible promotions.

Training all the instructors, including the supervisory staff, is a tough job, but one that should not be shirked. It has to be done quickly but thoroughly. If there is no training department or training director to do the job, the best bet is to call in an outsider to do it on a consulting basis.

If that can't be done, try a "home-grown" plan of this sort: Give all instructors job-instructor training. The war-time Training-Within-Industry "JIT" program is still a good tool. It is immediately useful. If some men have already had such training, give it to them again. The review will help them. You may have to pay to have someone in your organization trained as a JIT trainer, if there is no certified trainer on the staff. That you can't avoid.

Give additional training to all men who will do any group instruction. Cover how to teach, how to make up lesson plans and teaching outlines, and how to use teaching aids, stimulate discussion, lead conferences, and test and follow-up. Get the necessary information from reading and from local education authorities, including training directors of other firms.

Also review specific facts about your own program, such as records required, grading system, attendance rules, and scope and nature of program.

---

by setting up poor facilities, the trainee can hardly be blamed for being equally disinterested.

These last comments apply also to teaching aids. Their use often helps to clarify and illustrate discussions as no amount of talking would. They, too, need not be elaborate, but they should at least be of sufficient quality to arouse the respect of trainees. The most common types of teaching aid are: (1) diagrams, charts, and photographs; (2) models, samples, and "mock-ups"; (3) operating equipment (where items are small); (4) silent and sound slides; (5) silent and sound motion pictures; (6) demonstrations and experiments; (7) visits and field trips; (8) case studies.

All of these aids lend interest and variety to training. More important, they often help to put ideas across faster and more effectively. This can be a significant point where total salaries of trainees in a small class may run to $40 or $50 an hour. In fact, savings in training time sometimes pay for the cost of training aids the first time they are used.

---

gesting that he observe and talk with the trainee, thereby encouraging him to use what he has learned. Aside from its value in improving training effectiveness, this practice is a wholesome industrial relations aid.

Reporting of training progress is of great importance both as a selling device and as a means of identifying areas of weak activity.

To make reports, records have to be kept. If allowed to, this can become a major burden. The only way to avoid excessive paperwork is to insist on the use of a single, simple report form which each instructor sends regularly to some central location. A point to watch here is the common tendency not to ask for reports from those who do on-the-job instruction. This basic function should not be overlooked, and should be reported as carefully as any other type of training. The report form includes the name and number of each employee trained, the subject or operation in which training was given, the amount of time devoted to training, and some evaluation of the trainee's performance (grade or rating).

Reports to management on the status of the entire training program can readily be made up by summarizing briefly the individual reports sent in by instructors. Such reports should be simple. Those wanting further information should be encouraged to examine the original data.

---

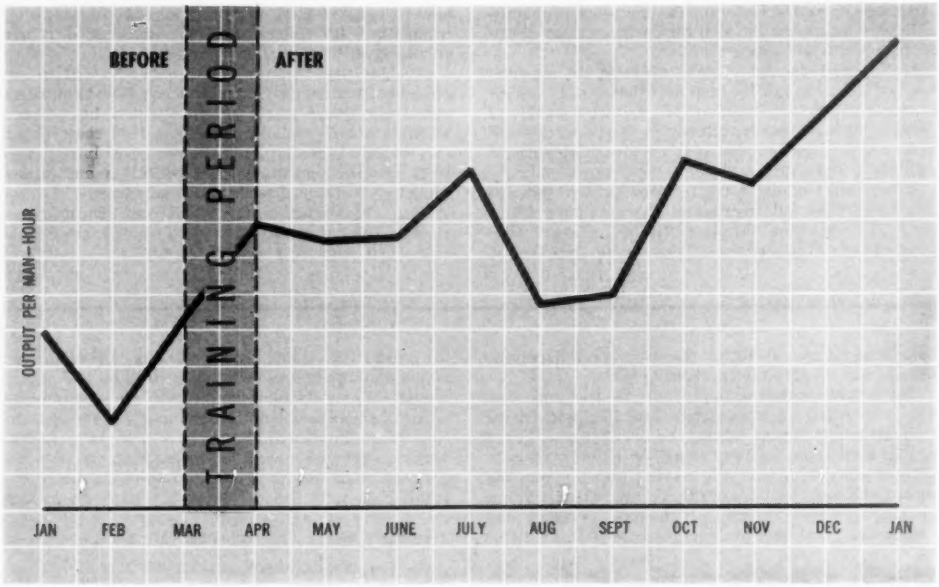
3. Start high enough in the company to get real results. Nothing is more overworked than the old saying that you have to start selling at the top. This isn't literally true, in most cases, but you do have to start high enough up to insure against cancellation of plans, cutting off of funds, or blank incomprehension when subordinates discuss training projects with top executives.

4. Dress up the sales story so that it really does its job. You can learn a lesson from the advertising profession by adopting the practice of using formal "presentations" to sell training projects. A presentation is a concise, interesting summary of the proposal—what it is, why it is important, what it will accomplish, how long it will take, and how much it will cost. All sorts of devices can be used, limited only by imagination and time available. Charts, slides, recordings, skits, and actual demonstrations are methods that have been used successfully.

You don't have to limit use of presentations to the top levels. It is just as useful to sell foremen, superintendents, and plant managers.

Continued on next page

CASE 1 · HOW FOUR COMPANIES SOLVE SPECIFIC



INCREASED WORKER OUTPUT resulted from Walter Kidde & Company's four-week training program for shop workers in cylinder pickling department. Graph shows continued increase in output due to training

In-Plant Training Ups Output and Saves Us Money

J. C. RECORDS · SUPERVISOR OF TRAINING, INDUSTRIAL RELATIONS DEPARTMENT
WALTER KIDDE & COMPANY, INC., BELLEVILLE, N. J.

WHAT PLANT PERSONNEL DON'T KNOW *will* hurt them. That has been proved repeatedly by the successes we have achieved in our plant training program. The results have convinced management and workers that there is a direct relationship between successful over-all operations and the individual's knowledge of his job.

The following case histories illustrate how sound training techniques can be used successfully to solve a variety of training problems. The cases also show how training can produce real savings.

I. INCREASING OUTPUT ON ROUTINE SHOP JOBS

A study of the cylinder pickling department's operations and production records revealed several unhealthy conditions. Bonus earnings were substandard. We were wasting valuable chemicals. The volume of rework was on the upswing. There was little enthusiasm, and the various shifts did not cooperate.

As soon as these deficiencies had been identified and their cure set up as the objective, a one-month training course was started. Four 1½-hour meetings were held each week, on company time, for the 12 workers in the pickling department.

Our process engineer and our chief time study engi-

neer gave the course. Their "textbook" was a pocket-sized "Pickling Manual" especially prepared by the training section of the industrial relations department. The manual was inexpensively mimeographed.

Following the sequence outlined in the manual, instruction covered:

1. Importance of the pickling operation in the sequence of cylinder manufacture.

2. How cylinders are manufactured, the importance of thorough cleaning before pickling, and the action of the many chemicals used in pickling.

3. The steps to be followed in pickling. To make these clear, drawings were prepared, showing functional layouts of pickling tanks. Each tank was labeled with a clock symbol and thermometer to show length of time and critical temperatures.

4. General instructions to operators—responsibilities to the job, company rules, safety standards, and grievance procedure.

5. The theory and practice of setting production standards through time study, and the need for employee cooperation in the company's work simplification program.

Results. Even before training was completed, noticeable progress had been made toward our original objectives. Time study records showed that bonus earnings for the 3-month period preceding training averaged 10%. For a 3-month period just after training, earnings went to 16%, in spite of experimentation with chemical process changes which proved unsuccessful. After this experimentation stopped, bonus earnings went up again, to 24%.

The increase in bonus earnings was accompanied by a gratifying rise in output per man-hour. In fact, for the 9-month period following the course, bonus figures kept hitting new highs—proof that the results of the training were not temporary.

But how about our other objectives—the human relations side of the situation? Here, too, results were excellent. Misunderstandings about the rate setup and its fairness were cleared up. Worker attitudes toward the job and each other were vastly improved. And cooperation blossomed between shifts. The men had acquired a new sense of job pride through better understanding of their duties and the significance of their jobs to over-all company operations.

II. HELPING KEY MEN GET THE MOST OUT OF A NEW PROCESS

When induction and dielectric heating was first being applied in industry to a variety of manufacturing operations, we started a training course in its principles and practice. There were 51 trainees—engineers, methods men, and supervisors. Classes were held after regular working hours, on the employees' own time.

Results. The program was responsible for substantial production increases. On one item, originally hand-soldered at a rate of less than one a minute, practical knowledge of induction heating pushed production up to 20 a minute, an increase of 2000%. In addition, the quality of the job was greatly improved by the newly developed method.

This was just the beginning of a series of improvements in methods made possible by the induction heating know-how acquired during the training course. The total cost to the company for conducting this course was less than $400.

III. INCREASING PRODUCTIVITY OF AUTOMATIC MACHINES

An equally successful program was set up for the teaching of advanced cam design to a mixed group of employees. The following departments were represented—engineering, time study, scheduling, methods, production, and operational. Supervisors also were included in the group.

Employees attended on their own time, two hours a week. Teaching was done by a vocational school instructor.

Results. In terms solely of increased production, success was uniformly good. For example, production of 1400 pieces on one job required 70 hours, and a total labor cost of $122 before the cam design course was offered. Afterwards, the same production required only 32 hours, at a total labor cost of $68.

Once again, there were other important benefits in addition to increased production and lowered costs. Those who took the course learned how to spot inefficient cam layouts and substitute new layouts that did the job better. The knowledge of feeds and speeds gained by production scheduling workers enabled them to predict more accurately the backlog of jobs coming through to the manufacturing division. And this, in turn, enabled the production department to schedule machines and manpower better. Previous errors in estimating manufacturing time and coordinating jobs scheduled were greatly reduced.

Knowledge imparted by the course in cam design obviously carried far beyond the initial increase in productivity. It even developed several potential cam designers whose talents had previously not been recognized.

IN-PLANT TRAINING ALWAYS PAYS OFF

There are in our files records of many other training courses, covering a variety of subjects, such as metallurgy, effort rating, shipping and packing, heat treating and annealing, chemistry, hydraulics, and time study procedure. In every case, the results have more than justified the time and effort.

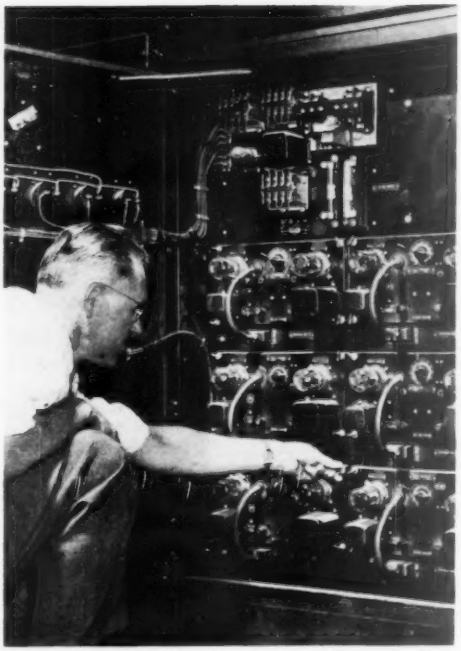
Naturally, we have not lost sight of the fact that ours is a manufacturing plant, and not a vocational school or a university. But we have learned that in-plant training pays off when it has a specific purpose and when it is properly organized for economical administration.

CASE 2 · HOW FOUR COMPANIES SOLVE SPECIFIC

INDUSTRIAL ELECTRONICS

1. **Instructor:** Bob Snyder, electrical engineering
2. **Length:** 12 weeks, 2 hours a week
3. **Time:** Monday or Wednesday, 6-8 p.m. (subject to change by decision of class)
4. **Class Program:** Slide films and records
   Discussion led by instructor
5. **Outline:** Based on new, practical, and easily understood course prepared by General Electric.
   - I. Harnessing the Atom
   - II. Electronic Tubes as Rectifiers
   - III. Grid Control of Electronic Tubes
   - IV & V. Fundamentals of Electricity
   - VI. Electronic Relay Systems
   - VII. Electronic Rectifier Equipment
   - VIII. Thyratron Motor Control
   - IX. Electronic Control of A.C. Power
   - X. Electronic Frequency Changing
   - XI. Photoelectric Relay Systems
   - XII. Electronics Today and Tomorrow
6. **Who should be interested:** Electrical staff and maintenance men
7. **Cost:** $8, if over 50 enroll
   $10, if 22-50 enroll
   $12, if 18 up to 22 enroll

COURSE ANNOUNCEMENTS like this were posted. Enrollment in voluntary courses was almost 100%



PART-TIME INSTRUCTOR explains feature of complex control box as part of maintenance course

We Train Our Maintenance Men to Keep Them Up-to-Date

N. N. ALSPACH • MANAGER, GOODYEAR INDUSTRIAL UNIVERSITY
GOODYEAR TIRE & RUBBER COMPANY, AKRON

FOUR YEARS AGO, our engineer in charge of electrical maintenance came to the Goodyear Industrial University with a problem:

"We're using more automatic equipment all the time," he said. "And I'm finding that our own electricians are making a lot of expensive mistakes in wiring and repairing these installations. The wiring is so complicated that I can't possibly find time to sit down with each man and teach him all about it. What can you do to help?"

That visit started a special training program for maintenance electricians that is still going on. The purpose was, and is, to help these skilled men keep pace with fast-moving technological changes.

Results: Between 100 and 125 electricians—and a number of supervisors, too—have gone back to school. To date they have taken three separate courses. And, by popular request, plans are now under way for a fourth course. The training done so far has more than paid its way. Expensive re-work is a problem of the past. All apprentices in the electrical crafts are getting similar training.

Attitudes also are good. Although the courses were strictly voluntary, registration was phenomenal, and drop-outs very few—about 10 per course, or less than 10%.

I. THREE COURSES—WITH EMPHASIS ON THE "HOW"

1. "Automatic Controls" was designed as the "tool course," to get the men quickly acquainted with the specific equipment currently in the plant. Emphasis was put on *how* the mechanisms worked and how to follow the wiring diagrams. Demonstrations and field trips into the plant helped to give the men a quick understanding of key facts. This phase of training required 12 two-hour sessions. (See FACTORY, June, 1946, for a description of this program.)

2. "Industrial Electronics" followed about a year later when it became clear that there was need for a better understanding of the fundamental theory of electronics. Such information would—and did—enable the men to keep on top of new applications of the same basic principles. This course also required 12 two-hour sessions.

3. "Radio Frequency Heating," in turn, followed another year later. It was an additional tool course, in recognition of the increasing importance of induction and dielectric heating in our manufacturing processes. The course required 15 two-hour sessions.

All three courses were given after working hours, taught by part-time instructors borrowed from our Engineering Department. Because of the large registration, each course was broken up into several sections. The result was that close attention could be given to individual problems.

The training outline for the first course was worked up by the instructor in close cooperation with the electrical engineer. The other outlines were simpler to make because the courses were built around two standard programs brought from outside sources. This gave us an excellent supply of text material and sound-slide films to start with. These materials were used, of course, only after thorough study revealed they were suitable.

A laboratory course is now in preparation which should round off this program of specialized training for electrical maintenance men. Upon completing the fourth course, these men are pretty well qualified to handle general service work on the more complex industrial electronics equipment.

II. HOW THE COURSES ARE ORGANIZED—AND RUN

The procedure used in planning and conducting the maintenance electronics program is typical of all Goodyear supplementary courses. No course is offered without clear proof of a real need. The foreman and division foreman are consulted at all times, and, in fact, often become the instructors. Attendance by employees is voluntary and on their own time after regular working hours.

Moreover, employees pay a small tuition fee, which does not cover the cost of the course but increases interest and participation. Fees range from $2.50 to $12, depending upon length and complexity of the course, and they include the cost of any text materials required. Better attendance, fewer drop-outs, and greater interest have proved the value of charging a small fee.

In all cases, outlines are worked up by the instructor who will teach the course, with help as needed from full-time training staff members. Courses are announced in bulletins and registrations accepted in person and by mail. Those employees who wish may pay fees on the installment plan. Because of variations in basic education, the atmosphere of courses is deliberately informal and nonacademic. Reports of progress to supervisors are therefore general instead of by specific grades.

Other courses. The maintenance electronics program is representative of the approach used for special and remedial training that can be handled on a group instruction basis. The policy is to set up "tailor-made" courses, in close cooperation with supervision. Each is designed to solve specific departmental or job problems that cannot be practically dealt with by regular on-the-job instruction.

Where the need is clear, there are no limitations on subject matter. Courses range from simple procedure training for whole warehouses and shipping departments to laboratory training in water analysis for synthetic rubber manufacture—from sheet metal layout to how to make budgets.

III. GOODYEAR TRAINING COVERS THE WATER FRONT

Special-purpose training to solve spot problems has become increasingly important. It supplements the three other major functions of the Goodyear Industrial University:

1. Apprentice training, which provides skilled journeymen. Programs last for 3 to 4 years, and include extensive classroom work in subjects related to basic skill instruction.

2. Squadron training, which develops supervisory and staff personnel for promotion over a 2- to 3-year period. This is an after-hours program involving 3 hours of classroom and conference instruction weekly.

3. Part-time school, which is an extensive night school program. At present, 29 separate courses are offered to interested employees. Diplomas are granted for completion of organized programs in four fields—Practical Engineering, Factory Management, Business Administration, and Secretarial Training.

Taken as a whole, the Goodyear plan "covers the water front." It provides solutions for both long- and short-term shop training needs. Long experience has shown that this integrated approach is for us, at least, the best means of increasing efficiency and reducing costs.

CASE 3 · HOW FOUR COMPANIES SOLVE SPECIFIC

SUPERVISORY TRAINING PROGRAM

SUBJECTS	MONTH
1. The New Employee	March
2. Qualifications of a Supervisor	April
3. Organization	May
4. Quality, Supplies, and Products	June
5. Morale: Know Your People; Discipline; Handling Complaints	August
6. Planning and Scheduling	October
7. Material Control	November
8. Time and Motion Study	December
9. Waste, Safety	January
10. Tools and Equipment	February
11. Interpreting Company Policies	March
12. Cost	April

SUBJECTS SELECTED BY FOREMEN show keen interest in knowing more about the business and about basic management techniques. Men worked out topics

HUMOROUS SKITS put serious ideas across with a bang. Intense interest was aroused by a well-acted skit in which foremen and assistant foremen played the roles

Supervisors Train Themselves

GEORGE LAMBERT · DIRECTOR OF PERSONNEL TRAINING
MOTOROLA, INC., CHICAGO

EVERYBODY AGREES that the best kind of training is the kind that requires active participation by the trainee. The Motorola Supervisory Training Program carries this idea through to its logical conclusion:

Members of the supervisory organization train one another, thus giving complete participation.

The plan works two ways. Foremen and their assistants train first-line supervision (we call them supervisors). But to do so, the foremen also have to train themselves. Therefore, both groups profit. Furthermore, the give-and-take nature of the training meetings is as instructive for "teachers" as for "students." Everyone is interested because everyone participates.

Results. Our program is getting results. Always a good group, foremen and supervisors are more alert than ever to the key importance of good management for the success of the business. This has already shown itself in many ways.

Company policies are better understood and accepted. Concrete suggestions for improvements are being made in greater volume. Ac-

of supervisors and workers in typical problem situations. Highlighting the theme, "Know Your People," the actors set the stage for four successive discussions of basic problems of worker morale. Purpose was to show what NOT to do, as base for developing practical ways to build worker interest and cooperation

cident and labor turnover rates are on the down grade. And quality and output are going up.

It isn't sensible to claim that all the good things that are happening are wholly due to this one supervisory training program. We know that achieving high production and low costs is a team job. Every department and individual has a contribution to make. The aim is to build on this sound foundation: *to make a good record even better, and to prepare key supervisors for greater future responsibilities.*

I. FOREMEN PLAN AND EXECUTE TRAINING

The teachers. There are 60 foremen and assistant foremen. These men are organized into a "faculty" of 12 five-man teams. Twelve senior foremen volunteered to be chairmen of the teams. The chairmen then selected the men for their own committees.

Each team is responsible for making a detailed study of a topic of major importance to the Motorola supervisory staff. The purpose is to work up four complete training presentations.

All members of the training teams were given instruction and practice in effective speaking and conference leadership before beginning their preparations. These courses were of great help in getting the program off to a good start.

Every company facility is available to aid the various teams. Help is obtained from individual department managers, executives, textbooks and other written materials, and from the training department. Part of the plan is the idea of giving the teams complete freedom in working up their presentations—

OPEN FORUM was another technique used to arouse interest and stimulate discussion during four-week period devoted to study of worker morale. Aim was to get everybody "in the act" wherever possible

STUNTS HELP to put across ideas too. Here the "professor" patiently explains a point to a "student"

EXECUTIVE REPORTS also helped to lend variety. Vice president tells about worker attitude survey

nothing is forced on them. As a result, the programs so far developed have been fresh and varied. In fact, remarkable ingenuity has been used in developing new ways to arouse interest and drive home key points.

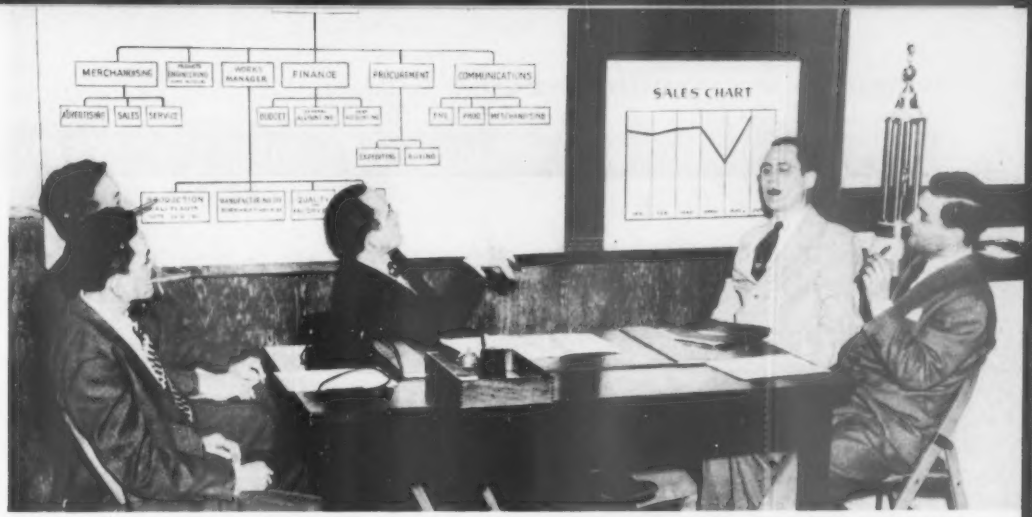
The students. In a sense, the foremen and assistant foremen are *their own* students. But the real student body is made up of the 120 first-line supervisors who report to the foremen and assistant foremen. These supervisors are in close daily contact with shop operators. They are the largest supervisory group, and are most in need of practical help.

For training purposes, supervisors are separated into three groups of 40 individuals. Each group meets once a week for a 2-hour training session. Meetings are held on company time between 1:30 and 3:30 p.m. on three successive days.

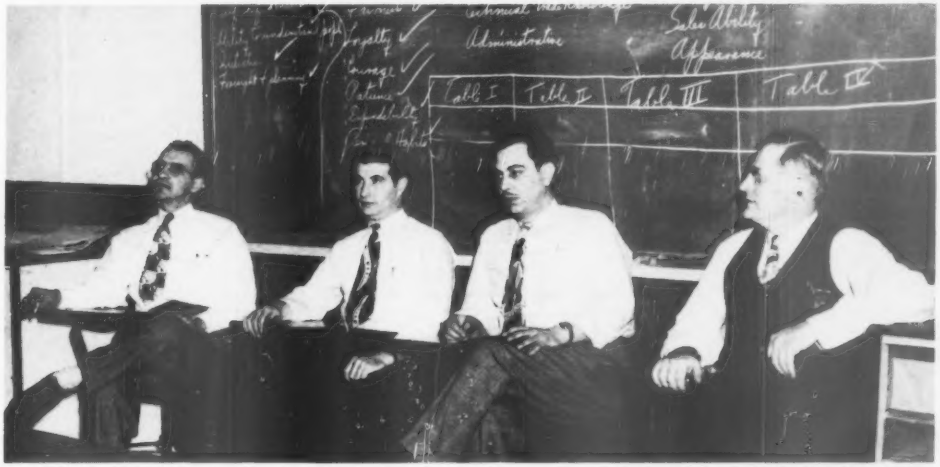
II. VARIETY OF METHODS HELPS TRAINING

Topics. The foremen and assistant foremen themselves decided on the subject matter of the program. The topics they selected were the ones that they felt were currently most important for them (Figure 1).

No punches were pulled in pointing out that every topic was chosen to improve output or quality, or to cut operating costs. Neither the men nor the management felt it was necessary to apologize for setting up the program in this businesslike way. The result has been that meetings have been built up around specific operating problems within the plant. Generalities have gone out the window.



ROLE PLAYING is enthusiastically undertaken by five man foreman "training team." Here the men are working on a problem as the Board of Directors. Unlike most role playing, session was rehearsed



PANEL DISCUSSION on qualities of a good supervisor stirs up plenty of interest. Large groups were also broken up into three or four small round table units to get more active participation by supervisors

Training methods. One of the most unusual features of the Motorola program is the variety of training methods in use. Group discussions, panel discussions, debates, role playing, skits and stunts, visits to other plants, and talks by executives are all relied upon. These are supplemented by visual aids, such as movies, silent and sound slides, enlarged pictures and drawings, and demonstrations. Several different approaches are used in each meeting to keep interest and participation at a high level.

"Classroom atmosphere" is completely absent. There are no textbooks, formal lectures, homework, or examinations. And no detailed or verbatim record of meetings is kept—which encourages frank discussion. Specific recommendations, however, are carefully noted and acted upon, if practical.

At the end of each 4-week period, the foremen's team that was responsible writes up a summary of its presentation as a permanent record for the whole group. The summaries are also distributed to all members of higher management for their information and guidance. Management is thereby kept close to what is being done at all times.

The next step. Supervisory training is a continuing process. The next step, to be undertaken when the first phase of the present program is over, is to apply the same self-instruction methods further down the line. The supervisors will be given the opportunity to set up training teams for group leaders. We are convinced that this plan of deeper penetration into the organization will continue to produce sound operating results.

CASE 4 · HOW FOUR COMPANIES SOLVE SPECIFIC

We Train Management

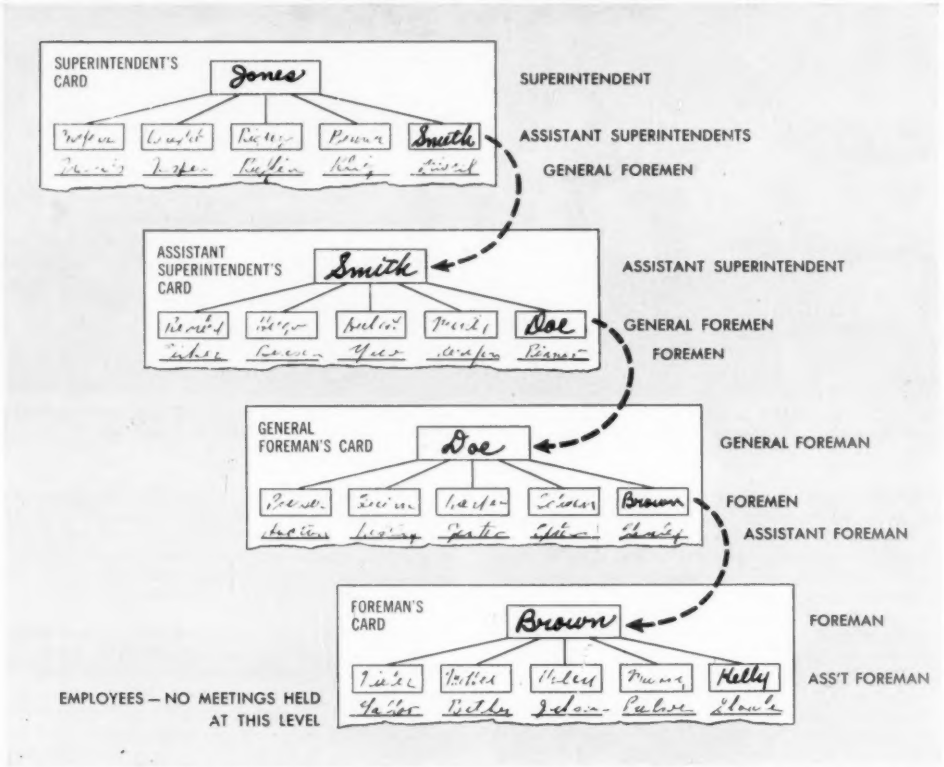
E. R. SWINT • DIRECTOR OF EDUCATION, THE GLENN L. MARTIN COMPANY, BALTIMORE

TWO MONTHS AFTER the Glenn L. Martin Supervisory Follow-Up Discussion Program was started, supervisors were asked their frank opinions of its value. The response then was so enthusiastic that the program was continued.

Now, *almost 5 years later*, supervisory follow-up discussions are still going strong. The SFD's, as they are called by the supervisors, are actually getting a more enthusiastic response than ever.

A short time ago, we obtained graphic proof of the value of the plan. One week's discussion was devoted to a summing up of past subjects and a poll on future needs. The response was immediate, flattering, and positive. Over 300 different topics were suggested for future use.

The SFD program follows the "chain of command" from top management down to first-line supervision, and then back up to the top. It fixes responsibility for supervisory development clearly.



WEEKLY CONFERENCES follow the chain of command from the top down. Each key man, except superintendents and assistant foremen, is a conferee one day and conference leader the next day

52 Weeks in the Year

I. TRAINING BEGINS AT THE TOP AND WORKS DOWN

The first phase—from the top down—consists of regular weekly conferences, in which excutives and supervisors play a dual role. In one conference, the supervisor is a member of a discussion group that is being led by his immediate superior. The group literally "takes apart" a single subject in a fast-moving discussion limited strictly to a half-hour's duration.

The next day, the supervisor becomes the *conference leader* of a discussion of the *same topic* by his immediate subordinates.

Thus, in four days of each week, and at a cost of no more than one hour of a supervisor's time, every key man in the company has discussed and analyzed some basic topic. (Figure 1).

Topics and guide sheets. The topics for discussion concern company policies, human relations, and management methods. They do not cover the technical problems of producing aircraft. Suggestions of things to discuss come from many sources. Most are offered by the supervisors themselves, higher management, and the Education Section.

Each meeting is sparked by a "guide sheet," on which the problem for discussion is stated. The subject may be a thought-provoking "case problem," a statement of management principle, a company policy, or a human relations approach.

Besides describing the subject, the guide sheet also contains questions or comments to stimulate discussion. It never has *answers*, except where official company policy is involved.

Guide sheets are prepared by the Education Section and submitted to an editing panel of nine executives from line and staff departments. The panel's job is to be hard-boiled and critical. Anything that doesn't promise to provoke practical, constructive discussion is thrown out or revised. If the panel is not sure, it will sometimes "pre-test" a guide sheet on one or more discussion groups.

Discussions. The lead-off discussions each week are conducted by the factory manager, engineering department managers, procurement director, and their counterparts in all line and staff divisions of the company. Each of these men meets with his immediate subordinates, five to nine in number, in the early part of the week.

At the end of the discussion, each conferee receives enough guide sheets for his whole supervisory force. He then meets with his own immediate subordinates in turn and goes through the same procedure. So it goes until the first level of supervision (assistant foreman) is reached. Assistant foremen participate only as conferees, except when occasionally asked to lead a conference for the experience.

II. REVERSING THE FLOW OF IDEAS

Thus far, the flow of ideas and questions has been is one direction—downward. Now the flow is reversed. Ideas, criticisms, and questions start up the line toward the top.

This is done by using a card which each man signs to record attendance, and on which there is space for comments, criticisms, and suggestions of future topics or ways to improve discussions. Conferees feel free to write what they think.

If, for example, any topic fails to stimulate fruitful discussion, the cards flow up the line vigorously. These men are practical and busy. They want the half-hour to mean something very real and practical to them—and they don't mind saying so, when the occasion demands.

Organization charts. A constant reminder of the two-way channel of responsibility and authority is provided by a "line and circle" chart which each supervisor keeps in constant view in his office. This is a departmental organization chart showing the supervisor the *names* of all men who report directly to him, as well as the name of his immediate superior.

This card reminds each supervisor of his responsibility to follow through on any matter requiring attention by his supervisors or subordinates. The importance of two-way responsibility is made graphic.

III. IT ALL PAYS OFF IN BETTER SUPERVISION

Follow-up features. In practice, the whole SFD program contains follow-up features of several types:

1. Information can be passed on promptly and personally from one company level to another without fuss or trouble.

2. When decisions are reached by conference groups, action can take place promptly, and direct follow-up in both directions is assured by the system.

3. When policies and procedures need to be set up or revised, the SFD plan gives notice of the need often within a matter of hours. In turn, changes can be brought about within a matter of days.

These are major advantages in a big organization. But they work equally well on a smaller scale, too. The supervisory follow-up discussion plan supplies management with a sturdy, insistent expression of need for guidance where the need is most urgent. And it supplies a mechanism for quick and effective transmission of information that pays off in better supervision and therefore more efficient production.

TIPS TO GOOD HUMAN

NEW COLD DRUG CUTS ABSENTEEISM

You can cut down the number of costly colds among your workers by using the new anti-allergy drug. But, of course, don't expect it to do a 100% job.

That's the conclusion based on a 9-month research program at Sylvania Electric Products. Dr. H. E. Tebrock, Sylvania's Medical Director, used 1000 employees as his "guinea pigs" in his investigation.

The results of this study and others run by hospitals and research centers suggest that industry at last may have the tool for controlling absenteeism that it has been looking for. Colds are estimated to cause 40% to 60% of all absenteeism—a loss of somewhere between 60-million work-days a year. Caution is still in order, though. Authorities point out that the new "anti-histamine" drugs work where cold symptoms are due to allergies. So—don't expect the new drugs to work *every* time.

HOW TO CURE A PENSION HEADACHE

Your union signs an agreement that doesn't mention pensions but later decides to come back at you with a demand for a pension plan. Can you refuse to bargain because you have a signed contract? The National Labor Relations Board says, "No; you have to bargain."

Here's how one New England manufacturer got around the problem: He negotiated a two-year contract with one reopener at the end of the first year. The reopener was limited to the subject of basic rates of pay, which the contract defined to exclude pensions. Then he added this clause:

"With the exception of this reopening on basic rates of pay, the union further agrees that it will not present any further demands to the company for the duration of this agreement."

UNIONS "MOST SELFISH INTERESTS"

President Truman has been denouncing the "selfish interests" of the country. But he has never specified just who they were. A recent survey by the Psychological Corporation may help Mr. Truman to set up a definition.

Several thousand persons in 138 cities were asked this question:

"In a recent speech, the President accused certain 'selfish interests' of obstructing progress. Who do you think are the most selfish interests today, the businessmen, the labor unions, the farmers, the government officials, or any other group?

Labor unions won hands down, being named as the most selfish interests by 42% of all people. Government officials and businessmen were way behind in second and third places (19% and 17%). Farmers were fourth, with 4%.

Even among union members, businessmen fared pretty well. Labor unions were named most selfish by 26% and businessmen by 27%. Government officials were third with 20%.

TEACHING SUPERVISORS BY MAIL

"Be a Better Boss" is the title of a correspondence course prepared by the New York Central Railroad Company for its supervisors. Open to "supervisory employees who desire to improve their executive skills and talents," the course comes in 10 lessons. Each lesson has an attached quiz sheet which the supervisor fills out and sends to the personnel department. Graded quizzes are returned to the employee with the next lesson.

VISITORS GET ECONOMICS LESSON

Cleveland Graphite Bronze Company uses a "take apart" bronze dollar three feet in diameter to explain the economic facts of industrial life to employees and visitors. Plant tours conducted twice a week end up in the plant cafeteria for refreshments. At that time, a top executive (10 rotate on the job) takes the dollar apart to show how and why it is spent.

This year so far the story has been given to some 2000 visitors, and (at special meetings) to 3000 employees.

Cost of the program, primarily for refreshments, runs about $3000 annually. For about 50 visitors a week, it takes 10 man-hours for top executive guides, and others who participate.

UNION HELPS TEACH TIME STUDY

Time study training for supervisors and union officials in joint classes is not new. Lots of companies find this to be an effective method of cutting down misunderstanding over incentive plans.

However, the teachers of such courses are almost invariably management people. Reliance Electric & Engineering Company has put a new twist on the formula by having the union do some of the teaching. Thus the head of the standards department shares the teaching job with two union time study stewards. Result: misunderstanding has been reduced to nil.

RELATIONS *for Factory Executives*

GOOD WILL GIFTS FOR JOB SEEKERS Every time you turn down an applicant for a job, you run the risk of creating bad public relations for your company. The more turndowns, the greater the potential damage. The usual solution is to be as courteous as possible and hope for the best.

But that's not enough, in the judgment of American Greeting Publishers, Cleveland. Due to the company's very high hiring standards, only one in 35 applicants is hired. To send the 34 rejectees away with the best possible feeling toward the company, American Greeting gives each an attractive gift box of greeting cards. This little "extra," added to the usual employment department courtesies, builds real good will even though the applicant doesn't get the job.

VACATION IDEA FOR OLD-TIMERS One way of giving additional benefits to your old-timers is to grant them longer vacations. The Fluor Corporation, Los Angeles, has put something extra into this formula for its salaried employees beginning with their 25th anniversaries. Here's how the plan works:

After 15 years of service, employees get a 15-day vacation, but at the 25th anniversary, they get 25 days, dropping back to 15 the next year. Then at the 30th anniversary, the vacation goes up to 30 days, again dropping back the next year. Thereafter, eligible employees get a 30-day vacation period every fifth year.

This, the company feels, helps to give a special meaning for the employee to his important anniversary years.

FOLDING POST CARD SOUVENIR A folding picture post card makes an ideal souvenir gift for open house visits, and year-round distribution too. That's what General Electric's Erie Works found when looking for a new and interesting way to get the plant story across to visitors.

Patterned after folding post cards so often seen at summer resorts, the GE souvenir contains six panels, printed on both sides. Twenty-seven views of the plant's operations and employee activities are shown. Size and weight of folder are suitable for mailing with a 3-cent stamp. The company printed 25,000 cards at a cost of 7 cents each. Samples may be obtained by writing George B. Fluegel, Personnel Division, General Electric Company, Erie, Pa.

PAID HOLIDAY FOR HUNTERS Another example of how varied paid holidays can be comes from SKF Industries, Inc., Shippensburg, Pa. The opening day of the small-game hunting season in Pennsylvania sees the plant shut down and the workers off—presumably seeking the elusive rabbit, at company expense.

DO UNIONS BELIEVE IN PENSIONS? On the subject of pensions, "Do as I say, not as I do," seems to be the rule of the International Typographical Union. Reason: A membership referendum has just turned down a pension plan for its own workers by a more than 2 to 1 majority.

Comment by an ITU vice president: "We will have advertised to the world that the members of ITU do not believe the cost of pensions is a proper charge against the cost of doing business."

Oddest note: At its August convention ITU ordered all locals to demand pensions from their employers.

WHICH MINIMUM WAGE COUNTS? Say you are a government contractor and required to pay a minimum wage of 65 cents an hour under the Walsh-Healey Act. Will you have to pay 75 cents in January when the new Wage-Hour law minimum goes into effect? No, you won't. The Walsh-Healey Act takes precedence.

Don't count on this fact too heavily, though. Secretary of Labor Tobin is already taking steps to up all government contract minimums that are below the new 75-cent floor. And even if Tobin doesn't get around to your industry before the first of the year, watch out for pitfalls. If some of your work is for government contracts and some for private buyers, you will face the problem of figuring out a way of keeping track of two sets of minimums.

COMMUNITY-WIDE SUGGESTION PLAN Is your suggestion system in the doldrums? If so, maybe you ought to study the community-wide plan now in effect in Rochester, N. Y. Thirty-five companies are already participating in this joint effort. Set up as the Rochester Industrial Management Council, the program is reported to be giving excellent results.

TRANSFER STATION. Plantwide trolley conveyor at United Specialties runs from the welding department through testing, soldering, and painting operations, meets final assembly conveyor at this junction point

How We Got Better Handling—

The formula was simple: Take a plantwide trolley line, connect it up to a final assembly belt conveyor to provide a low-cost materials handling team

C. F. NEWBURG • CHIEF PRODUCTION ENGINEER, UNITED SPECIALTIES COMPANY, CHICAGO

MANAGEMENT CONCENTRATION on materials handling methods is paying handsome dividends to United Specialties. Our objective—*to eliminate manual handling methods and install mechanical devices wherever possible.*

First we made a materials handling survey. The production engineer, materials handling supervisor, production supervisor, the head of the methods department, and members of top management acted as a joint committee.

We then invited equipment manufacturers to offer suggestions. Members of the materials handling committee visited other plants doing similar work to find out how they had solved their handling problems. During those plant visits many valuable ideas were uncovered that could be applied at home with profit.

The primary objective was to simplify and improve plantwide transportation of materials from one department to another. A trolley conveyor, equipped with trays, was installed. It runs from the welding department through the testing and soldering departments into the paint shop, and from there to the final assembly line. All material from the welding department is passed on this conveyor. And the unit that needs to be soldered or

BENCH-LEVEL BELT CONVEYOR serves all final assembly work stations. All work is done directly on the belt. Conveyorized assembly has eliminated temporary storages between operations on the line

and a 20% Cut in Unit Costs

tested is removed in either department for the necessary operation.

This installation has minimized interdepartmental trucking expense. Product flow is smoother. Schedules are easily maintained.

Manual Handling Minimized

One thing we learned from the survey was that operators did a substantial amount of manual handling between operations. It was necessary for them to pass units to one another. At every workplace a pickup-and-position operation was required before any productive work could be performed. This was costly. It was fatiguing. And it slowed up production.

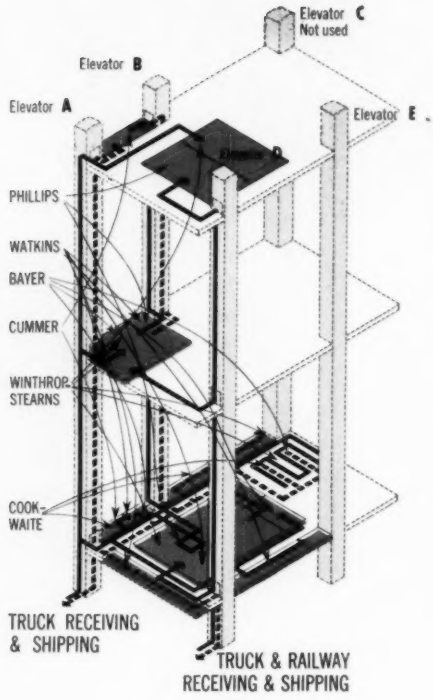
Some sort of mechanical device seemed to be the solution. A bench-level belt conveyor was therefore installed. Now operators do their work directly on the conveyor.

Floor storage racks were formerly required in the decal and packing department. The operations in this department are (1) clean the painted surface, (2) apply cement, and (3) place the decal on the air cleaner. Drying time was required between operations. Floor storage racks were placed behind the bench line for this purpose.

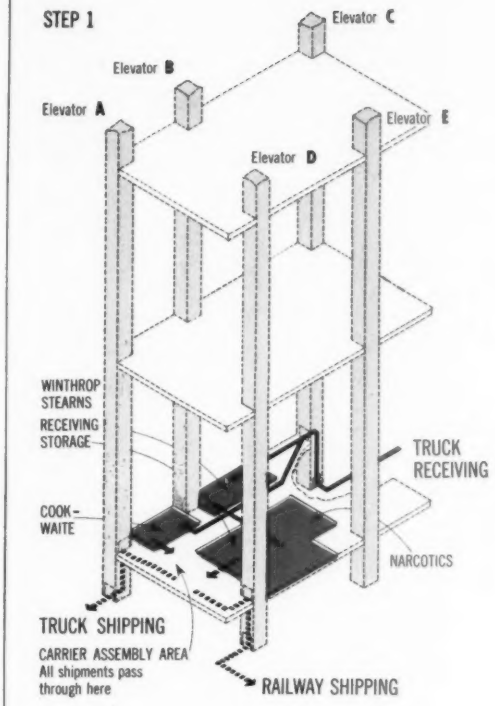
The bench-level conveyor was built long enough to allow a "float" between operations for drying time. With this improved method, the unit flows down the belt line with one operator doing the cleaning, another the cementing, and a third putting on the decal. Manual handling in and out of the old storage racks has been eliminated. Only direct operations are now performed. Also, the operator does not have to walk from one unit to the next. He performs his operation as the cleaner passes his work position. When the work is done, the units travel on the same conveyor to the packing benches.

What It All Means

As a result of the materials handling program, plantwide production costs are down better than 20%. Floor space has been saved. And the jobs of all the workers have been made easier.



PROBLEM **Rapid business expansion left warehousing operations snarled, as shown. Elevators were used for 2-way inter-floor traffic**



SOLUTION **Starting on lower floor, important change was new carrier assembly for all outgoing orders. Operations for each division were**

Relayout of 3-Story Warehouse

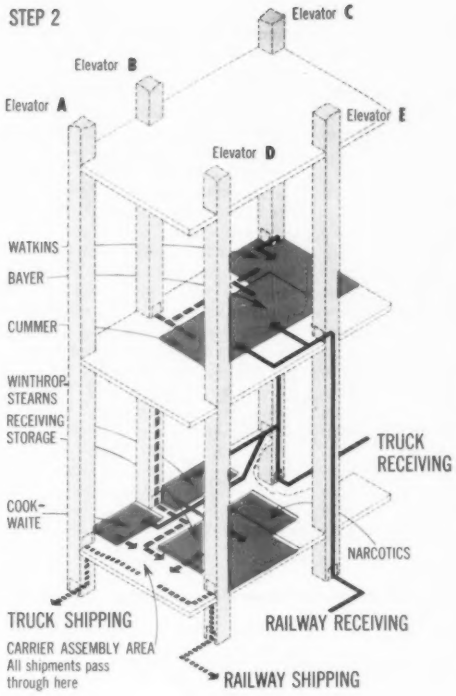
Snarled elevator traffic was the crux of this handling problem. A complete survey of the system resulted in better floor layouts, improved elevator service, and lower inventory costs

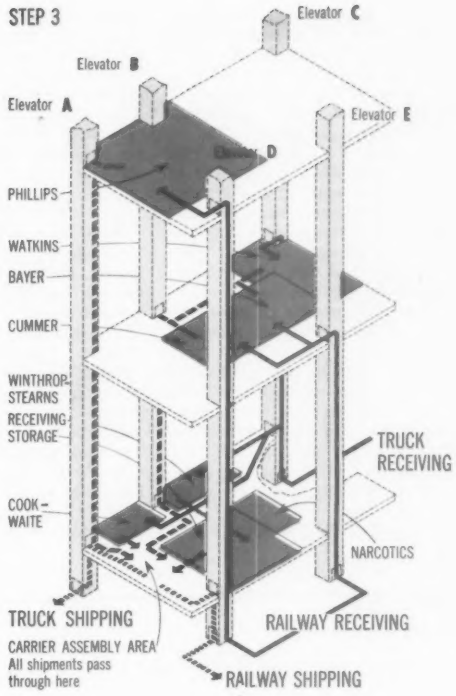
FLORENCE RYDER • SYSTEMS ANALYST, STERLING DRUG INC. NEW YORK

BY MAKING some changes in layout at Sterling Drug's Chicago warehouse, we greatly improved service to customers. Reduced manual handling by more than 30%. Tidied up housekeeping considerably. The cost of these changes was relatively modest. In the first year alone, over-all savings were many times the amount invested in them.

The original 3-story layout (above, left) shows that cross traffic in storage areas and on elevators was exceedingly heavy. Shipping and receiving functions were handled at the same spot. Track and rail platforms were always congested with two-way traffic.

The conditions that necessitated the changes had been long in developing. Back in 1941, Sterling's total annual business was $47 million. By 1948, sales volume had grown to $134 million. Rapid growth of that sort requires a heavy concentration of attention on production, sales, finance, and other matters. Further, while our Chicago warehouse was overcrowded, suitable additional space was not available. About the time we began a





then concentrated within well-defined boundaries. Next step was to get one-way traffic in each elevator. Use of both rail and motor truck facilities complicated matters.

End result is straight-line flow of goods from receiving to shipping. Unit handling cost is 30% less. We are able to give faster service with fewer errors

Cuts Handling 30%

serious study of the problem, 25% more floor space (more than 9000 square feet) became available for use; then Winthrop-Stearns, Inc. (a Sterling subsidiary) opened a new warehouse in Dallas, taking from Chicago about one-third of its own stock but leaving intact the stock of other Sterling units.

The Chicago warehouse receives, stores, and ships 25 million pounds of packaged medicines annually. We make both bulk and small-order shipments of some 1300 products. Shipments move in and out by both motor truck and rail.

Before we made the new layout, six Sterling divisions and subsidiaries occupied the third floor and portions of the fourth and fifth floors of Chicago's North Pier Terminal Warehouse. Altogether, Sterling used about 36,000 square feet of space.

Complete Survey Needed

One obvious way to cut costs was to improve the layout and the whole shipping system. We made a complete survey, because the job could not be done successfully in piecemeal fashion. Additional space that became available while the survey was in process permitted more flexibility in the relayout.

Taking available space and stock-turnover data, we apportioned storage space for each product on the basis of an economical stock level. Separate receiving and packing areas were set up for each division.

We relocated division areas to reduce elevator crowding and cross-traffic to the minimum and to give better control of inventory.

Another important factor in allocating space and position was the method of transportation most important to each division. The truck dock at elevator *A* was used for both shipping and receiving. Elevator *C* was not available, originally.

On the other side of the building, a railroad siding was served by elevators *D* and *E*. Elevator *B* was designated for inter-floor use. It was imperative for smooth opera-

tion that separate elevators be used for incoming and outgoing traffic.

Problems of layout and flow were resolved to concentrate traffic in one direction only in each elevator. Steps 1, 2, and 3 in the diagrams show how we did this.

By keeping elevators free for one-direction hauling, the job of setting up storage and flow systems for each department was simplified. Take the Phillips Division, for example. Incoming railway shipments move up elevator *D*. Stock flows in straight-line fashion across the floor. Shipments go down elevator *A* to the carrier assembly area.

Another important contribution to orderly flow of shipments from the six divisions was provision for assembly of orders. A number of carriers move material from the warehouse each day. They may move stock from one or all of the six divisions.

To facilitate the assembly of shipments from each division for each carrier, we set aside an area for assembly. There, orders are marshaled under carriers' names. Stock is loaded on skids awaiting removal. This area, located on the lowest "Sterling" floor, is served by elevator *A* going to the truck dock and elevator D to the rail platform.

Straight-Line Flow

Once location and stock requirements had been established, individual division layouts were engineered. Our objective in each case was to establish straight-line flow that would tie in with the elevators. Another objective was to reduce manual handling of each item. Once an item has been packed, it is removed from the packing section and deposited at the carrier assembly area in one operation.

Going beyond physical handling one step, we set up a straight-line flow of paperwork. We revised forms to include necessary shipping and inventory data in proper sequence. This means that all orders are processed speedily from receipt through inspection and shipment.

Step 3 in the diagrams shows how the lower floor was laid out to separate receiving and shipping functions. We get smooth flow of product into and out of storage. Notice how paperwork flows out of the office section through the shipping procedure.

Worth-while results were achieved because we approached the problem as a whole and integrated all department activity. In addition to results mentioned above, elevator operation has been speeded. Orders are shipped the same day they are received; receiving and shipping procedures are simplified. We have reduced errors in shipments to a minimum. Stock space requirements are constant because space is allocated on a usage basis. And output per man-hour has increased substantially.

Get Ready for the Social Security Tax Boost

ALL CLEAR ON WHAT TO DO about the higher Social Security taxes that take effect next month?

Here's a quick summary of how the boost works, and what every company should do to get ready for it.

The old rate of 1% of pay—levied on both employer and employee—goes up to 1½% on each.

The new rate will still apply to the first $3000 of earnings. That means that the most you will deduct from any employee's earnings next year will be $45; it has been $30. You have to match the higher deductions dollar for dollar. The net result is that the company's Social Security contributions will be a 50% bigger factor in its labor-cost picture next year.

Changing over to the new tax rates won't be automatic. You face two main problems that call for some advance planning.

1. Telling Employees

It's worth-while to go to some trouble to let employees know ahead of time about the new rates.

If you don't warn employees that deductions will be bigger, they'll swamp you with complaints about "mistakes" in pay. Your supervisors will also be on the spot, because many of them won't be able to answer questions about the new setup.

Moreover, a lot of workers, even today, don't realize that the employer pays half the cost of Social Security. Now is a good time to make that clear.

Here are some inexpensive things that you can do:

(a) Publish an explanatory article ahead of time in your employee magazine.

(b) Write an explanatory letter to all employees. If you do, it's a good idea to get the letter in the hands of supervisors and executives in advance of the general distribution.

(c) Enclose a brief explanatory note as a payroll insert the first time you deduct the higher tax. This will remind employees in a businesslike way that the law requires the company to make the deductions; also that the company is matching the workers' contributions with its own.

Many firms plan to use all of these methods of informing their employees. They think that several different approaches will give the best coverage.

2. New Procedures

The Bureau of Internal Revenue, which collects Social Security and income witholding taxes, is trying to simplify the paper work involved in tax reporting by having you use only one form for all collections.

Under the new system, you must deposit Social Security funds monthly in a Federal Reserve bank.

Four times a year you will then file the new form, giving a detailed statement of all taxes collected and contributed. You will, of course, use the old forms for reporting the last quarter of 1949. Thereafter you will have to use the new form.

You probably won't get copies of the new form until February or March. But you should get notices about the revised procedure in December.

If you haven't received these by Dec. 15, check up at the nearest office of the Collector of Internal Revenue. Some three million employers must be notified, and the government might miss a few. But it doesn't take any excuses for your not knowing the law—even if you weren't told.

The Labor Union Monopoly Bites *ALL* Workers

What kind of government is it which:

. . . Prosecutes the Great Atlantic & Pacific Tea Company which it asserts handles about 6½% of the retail food distributing business as an illegal monopoly in restraint of trade, and

. . . Seeks to break up four big meat packing companies and make them into 14 companies, charging the four with being a monopoly in restraint of trade, but

. . . Makes no move whatsoever to apply the federal anti-trust laws to the exercise of virtually 100 percent monopoly control of labor in the coal industry, and the only slightly less complete monopoly control of labor in the steel industry?

The answer to that question is simple. It is class government of the most flagrant type, a government by which special privileges are dispensed without justice and to the great injury of all workers. It is the kind of government which will lead to the early sacking of the American enterprise system and the personal freedoms of workers.

In legal terms the explanation of this flagrant affront to good government is also simple. In 1932 labor union activities were given virtually complete exemption from the application of the federal anti-trust laws by passage of the Norris-LaGuardia Act.

continued on next page

When the Norris-LaGuardia Act was passed labor unions were relatively weak. Only about 16% of the nation's industrial workers were organized, only about 12% of the steel workers. About two-thirds of the coal miners were union members, but only half that number were paying dues. The country was in the depth of its worst depression. The unemployment of about one-fourth of the labor force made monopoly control by labor seem so remote as to be almost fanciful.

But after only seventeen years devoted to the promotion of labor union organization by the federal government, we have labor monopoly with us. In its power and scope it makes the alleged business monopolies being prosecuted under the federal anti-trust laws seem positively piddling. In its manners it makes the old-time business monopolists look like Lord Fauntleroys.

What is lacking, grievously lacking, is action by Congress; action to shape our federal anti-trust laws to take account of the labor monopoly that has become the dominant national force in our country today—a force that is leading to the loss of freedom of all workers.

Before labor monopoly is broken up, as it must be broken up if our economy is not to be permanently wrecked, other steps will no doubt be required. But one test more than any other will be the touchstone of the nation's determination to keep its economic and personal freedom. It is what it does to see that labor monopoly receives the same treatment under the federal anti-trust laws as any other kind of economic monopoly.

The purpose of the federal anti-trust laws is to break up monopoly and preserve fair competition in the United States. It is a fine purpose. The wisdom and fairness of its application in particular cases is often open to challenge. But in spite of bad administration every farsighted business man I know is a staunch defender of our national anti-trust policy.

At present, in the exemption of labor monopoly, we have a breach in that policy which, if not closed, will soon become fatal both to the policy and the enterprise system it is designed to foster and protect.

The main thing wrong today with Great Britain and indeed all Europe is that no effective anti-trust laws are in existence to protect the public from business and labor monopolies, to guarantee personal freedoms. No free economy in Europe or America can prosper as long as protected monopolies remain and flourish.

While your representatives in Congress are home with you talk to them about the special privileges now granted to labor union monopoly. You would serve your country well by finding out what they intend to do about it before it is too late.

President, McGraw-Hill Publishing Company, Inc.

Send Gift Subscription

for FACTORY MANAGEMENT AND MAINTENANCE as checked below:

☐ 1 Year $3

☐ 3 Years $5

Bill to:

Name_____

Address_____

City & State_____

One Year Rates Outside U. S. A.: Canada $5; Latin America $6; Foreign $15

New Subscription Order

Enter a subscription to FACTORY Management and Maintenance for:

Name_____

Address_____

City_____ P. O. Zone____ State_____

Company_____ Position_____

Send bill for subscription as checked to:

☐ 1 Year $3 ☐ 3 Years $5

Name_____

Address_____ City & State_____

One Year Rates Outside U. S. A.: Canada $5; Latin America $6; Foreign $15

F. Dec. 49

Cost of Welders

y have been
ing Institute

transformer hum to a
tone is a pretty fair indi-
t one ignitron is acting up.
case, lack of immediate
leads to a shutdown.
est bet is to give close
to the recommendations
manufacturer. They will
ntinuous efficiency of re-
welding equipment. Here
ractices now being recom-
by the Resistance Welder
urers Association.

hing locker, or hat rack.
t the operator of a new
never to attempt actual
factory-installed electrical
anical machine elements.
ioning of the welder can
be corrected by simple
al adjustments. Actual
repairs should be under-
y by expert mechanics and
ns. Even your best opera-
tor is not necessarily an expert in
electronics or applied mechanics.

plant area in which the machine will operate. Do not permit oil, scrap or trash near the machine. Forbid use of the machine as a tool

2. Proceed Carefully During the Preliminary Tryout

Water flow. Before trying out the new machine, open the water valve to make certain that the water is circulating. On some machines a water flow indicator will operate when the safety switch is turned to the *on* position. Remove the electrodes to make sure that the water tube is down to not more than $\frac{1}{8}$ inch from the bottom of the water hole in the tip. Run the water with the electrode removed to see that the water enters the electrode through the tube, not through the holder water discharge. Re-seat the electrodes gently. Wipe up all spilled water. Then check for proper water discharge.

Pressure system. Check the pressure indicators before closing the welding line switch. Re-check the indicated pressure against the pressure that is recommended by the manufacturer of the equipment.

Electrical system. Close the line switch and control switch so that current and time settings may be checked before work is put into the machine. Check the welder on repeat. Notice whether the electrode force remains constant. On spot welders check both electrodes against a metal straightedge. See that the two surfaces are in line when checked from both the front and the side. Use a level to check the vertical alignment of the holder.

Check tightness of all nuts, bolts, or clamps that position electrodes.

On rocker-arm machines, check the horizontal position of the arms with a level. They should be parallel when in the welding position. The point of the weld should be the same height from the floor as the pivot point of the rocker arm.

Final check. Make sure that the electrical, mechanical, and control systems are all functioning properly. See that the current, time, and pressure are correctly synchronized. From the setup chart of the machine, check the electrodes for contour, alignment, and stroke. Adjust the pressure gage to the electrode pressure indicated.

On a.c. machines, obtain heat and time settings and adjust machine.

On electromagnetic - stored - energy machines, obtain current setting and adjust maximum energy relay.

On electrostatic machines, obtain capacity setting and capacitor voltage, and adjust the proper controls and transformer taps.

Continued on next page

When the Norris-L
labor unions were n
16% of the nation
organized, only abou
About two-thirds of
members, but only h
dues. The country w
depression. The un
fourth of the labor fo
by labor seem so rem

But after only sev
promotion of labor
federal government,
with us. In its pow
alleged business m
under the federal an
piddling. In its mar
business monopolists

What is lacking,
by Congress; action
trust laws to take ac
that has become the
our country today—a force that is stealing the
loss of freedom of all workers.

Before labor monopoly is broken up, as it must be broken up if our economy is not to be permanently wrecked, other steps will no doubt be required. But one test more than any other will be the touchstone of the nation's determination to keep its economic and personal freedom. It is what it does to see that labor monopoly re-

Europe or America can prosper as long as protected monopolies remain and flourish.

While your representatives in Congress are home with you talk to them about the special privileges now granted to labor union monopoly. You would serve your country well by finding out what they intend to do about it before it is too late.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In The United States

4¢ POSTAGE WILL BE PAID BY—
McGRAW-HILL PUBLISHING CO., Inc.

FACTORY Management and Maintenance
330 West 42nd Street
NEW YORK 18, N. Y.

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed In The United States

4¢ POSTAGE WILL BE PAID BY—
McGRAW-HILL PUBLISHING CO., Inc.

FACTORY Management and Maintenance
330 West 42nd Street
NEW YORK 18, N. Y.

How You Can Cut the Cost of Operating Resistance Welders

Manufacturers' instructions are your best guide. They have been summarized for FACTORY by the Resistance Welding Institute

RESISTANCE WELDERS depend on certain niceties of control for maximum production performance. In this sense they are "delicate" pieces of equipment, highly engineered to perform a precisely calculated task, with a certain minimum proficiency expected in the operator.

To perform that task satisfactorily in your plant requires continuous and correct maintenance. Such attention must start when you install the apparatus. And it must continue on a regularly scheduled basis.

Machine breakdown seldom results instantaneously from mechanical injury or gross misuse by an experienced operator. Good shop men simply are not given to that sort of carelessness.

Most failures, by far, are progressive in nature. Gradual blackening of a thyratron tube, for example, is a positive indication that the tube is wearing out. A change from the familiar transformer hum to a rumbling tone is a pretty fair indication that one ignitron is acting up. In either case, lack of immediate correction leads to a shutdown.

Your best bet is to give close attention to the recommendations of the manufacturer. They will insure continuous efficiency of resistance welding equipment. Here are the practices now being recommended by the Resistance Welder Manufacturers Association.

1. Make Sure Conditions Are Suitable

After the welder has been uncrated, check the line voltage on the welder nameplate against the shop power voltage.

Next, consult the circuit diagrams furnished with the machine. See that proper connections are made from the power source, through the control panels, to the machine itself.

Check also the conditions of the plant area in which the machine will operate. Do not permit oil, grease, water, or flash particles to accumulate anywhere near the transformer windings, wires, or connection points. Remember that welding machines are conditioned to operate in *dry* areas. Inspect the air supply for moisture. A suitable air filter and trap will assure properly dried air.

Post a prominent sign cautioning against allowing accumulations of scrap or trash near the machine. Forbid use of the machine as a tool crib, clothing locker, or hat rack.

Instruct the operator of a new machine *never* to attempt actual repair on factory-installed electrical or mechanical machine elements. Malfunctioning of the welder can usually be corrected by simple operational adjustments. Actual machine repairs should be undertaken only by expert mechanics and electricians. Even your best operator is not necessarily an expert in electronics or applied mechanics.

2. Proceed Carefully During the Preliminary Tryout

Water flow. Before trying out the new machine, open the water valve to make certain that the water is circulating. On some machines a water flow indicator will operate when the safety switch is turned to the *on* position. Remove the electrodes to make sure that the water tube is down to not more than $\frac{1}{8}$ inch from the bottom of the water hole in the tip. Run the water with the electrode removed to see that the water enters the electrode through the tube, not through the holder water discharge. Re-seat the electrodes gently. Wipe up all spilled water. Then check for proper water discharge.

Pressure system. Check the pressure indicators before closing the welding line switch. Re-check the indicated pressure against the pressure that is recommended by the manufacturer of the equipment.

Electrical system. Close the line switch and control switch so that current and time settings may be checked before work is put into the machine. Check the welder on repeat. Notice whether the electrode force remains constant. On spot welders check both electrodes against a metal straightedge. See that the two surfaces are in line when checked from both the front and the side. Use a level to check the vertical alignment of the holder.

Check tightness of all nuts, bolts, or clamps that position electrodes.

On rocker-arm machines, check the horizontal position of the arms with a level. They should be parallel when in the welding position. The point of the weld should be the same height from the floor as the pivot point of the rocker arm.

Final check. Make sure that the electrical, mechanical, and control systems are all functioning properly. See that the current, time, and pressure are correctly synchronized. From the setup chart of the machine, check the electrodes for contour, alignment, and stroke. Adjust the pressure gage to the electrode pressure indicated.

On a.c. machines, obtain heat and time settings and adjust machine.

On electromagnetic - stored - energy machines, obtain current setting and adjust maximum energy relay.

On electrostatic machines, obtain capacity setting and capacitor voltage, and adjust the proper controls and transformer taps.

Continued on next page

3. Follow Maintenance Recommendations

Cooling system. Water supplied to a welder should be cool and clean and not warmer than 60 degrees F. Leaks or condensation can seriously damage a welder. Turn the water off during shutdowns. Drain and blow the system dry with compressed air when the welder is to stand idle in an unheated plant during cold weather.

Electrode pick-up on aluminum spot welds indicates that an immediate check of the cooling system is necessary.

Electrodes, dies, and wheels. Electrodes require only a few readjustments. Examine the face of the tip for need for re-dressing, and for diameter. Check the flow of water for proper cooling. See whether the electrode has been dressed down too close to the bottom of the water hole. Also, whether it has been properly shortened when redressing.

Electrodes ought to be lathe-dressed before they have become so badly mushroomed as to make dressing difficult. Contour tools for special electrode dressing are available.

Do not clean electrodes with a file. Use abrasive cloth. Never remove electrodes with a pipe wrench. Use ejector-type holders wherever possible to avoid damage to electrode walls when making changes. Use a rubber mallet to align holders and electrodes.

Use only clean graphite grease to seal electrode tapers that leak.

Projection welding dies are subject to misalignment. See that the die is in complete contact with the part to be welded and is not worn, pitted, or damaged.

Check welding wheels for proper width and need for lubrication. See whether bearings are pitted or too tight.

4. Inspect Constantly During Operation

It is impossible to overemphasize the value of constant inspection during resistance welder operation. You can eliminate the vast majority of all troubles if you take time to check conditions in the shop; the water, air pressure, and electrical systems; the condition of the stock to be welded; and the proper synchronization of the force and heat elements of the welder. Time taken at the beginning of a run to assure proper jig setup, electrode condition, die alignment, and other important items will save many hours of eventual shutdown time. There are no short cuts to maximum welder performance.

These sloppy practices are a virtual guarantee of eventual breakdown: Hammering and filing of electrodes. Makeshift water or air hose patching. Setting controls by guess. Carelessness with regard to dampness in the shop. Allowing dust or filings to get into transformer windings. Permitting scrap to pile up around machine.

Ninety per cent of the time a welder arrives in proper condition to do the job that the experts designed it to do. The machine is basically as simple as the tools of the old-time blacksmith. For anvil and hammer the resistance welder substitutes electrodes rammed by air or hydraulically, dies, or wheels. In place of the forge, the welder uses heat developed by the resistance to an electric current of the parts to be welded. So long as these variables — force and heat — are properly regulated and timed the machine cannot help forming the proper weld, unless the stock itself is improperly cleaned and fed to the machine. A great deal of the time that is where the trouble lies.

What's Happening to the Closed Shop?

CAN YOU DENY A MAN A JOB just because he isn't a member of a certain union? The Taft-Hartley Act says "No, you can't—the closed shop is forbidden." But if what's happening in the Buffalo (N. Y.) area is any guide, the legal ban on the closed shop doesn't seem to be working as Congress meant it to.

The evidence for this conclusion comes from a survey conducted by Horace E. Sheldon of Cornell University's School of Industrial and Labor Relations. Here's what Sheldon says:

". . . the new labor law abolished the closed shop in neither form nor substance. The study revealed case after case in which old closed-shop practices appeared to have been unaffected by the new restrictions. The devices used to extend the former relationships varied from outright renewal of written closed shop contract clauses to vague understandings that only union men would be employed."

Whose Fault?

After talking to union and employer representatives involved in 127 union shop elections held in Buffalo since passage of the Taft-Hartley Act, Sheldon concludes that management is most to blame for evasion of the law. His reasoning goes this way:

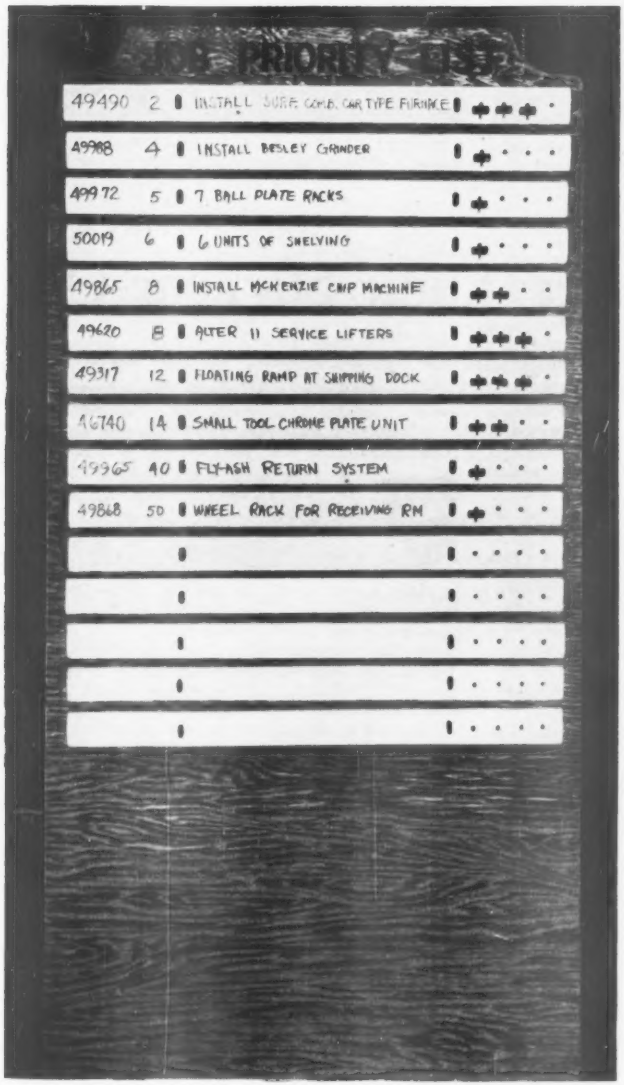
If management is willing to wink at violations of the closed shop ban, the unions certainly aren't going to complain. Yet, if there is no formal protest to the National Labor Relations Board, there will be no corrective action. The Board's agents don't *look* for violations. They merely act on complaints. The fault, says Sheldon, is therefore management's—first, for agreeing to closed shop deals; and second, for not complaining when forced into such arrangements.

Implications

There's plenty of room for debate about the correctness of Sheldon's analysis of who is to blame. But that isn't too important. More to the point is the fact that employers who agree directly or indirectly to union closed-shop demands are feeding ammunition to those who would like to prove that the Taft-Hartley Act won't work. The surest way to undermine the law is to let it be broken without raising a complaint.

Board Shows Next Maintenance Job

Maintenance foremen don't have to look far to find out what their next job should be. This priority board tells them at a glance. A color key shows normal working order for trades on each job


PRIORITY
49490 2 INSTALL SURE COLD CAR TYPE FURNACE
4998B 4 INSTALL BESLEY GRINDER
49972 5 7 BALL PLATE RACKS
50019 6 6 UNITS OF SHELVING
49865 8 INSTALL MCKENZIE CMP MACHINE
49620 B ALTER 11 SERVICE LIFTERS
49317 12 FLOATING RAMP AT SHIPPING DOCK
16740 14 SMALL TOOL CHROME PLATE UNIT
49365 40 FLY-ASH RETURN SYSTEM
49868 50 WHEEL RACK FOR RECEIVING RM

AS JOBS BECOME MORE URGENT, they are moved higher up on the priority board. As they are completed, panels are removed, old order data are erased, and panel is ready to be used for the next rush order

"FIRST TACKLE JOBS that interfere with production" is the motto of the maintenance department at the Sandusky, Ohio, plant of the New Departure Division, General Motors Corporation.

To make certain that such jobs are taken care of first, a job priority list board is mounted in the factory maintenance office. The priority of the particular job is determined by its position relative to the top of the board. As jobs at the top are completed, the panels are removed and remaining panels moved up. If a job at the bottom of the board suddenly needs to be rushed, it can be moved to the top of the board very easily and other jobs moved back, keeping the same sequence.

Work Order Indicated

The five-figure numbers on the left of the panels indicate the work order on which the work is to be performed. The second line of figures shows the department in which the work is to be done.

Keys at the right of the panel tell what trades will be needed for the job. The key of the trade that will perform the first operation is inserted first, and keys for the others follow in their normal work order. When the first trade completes its work, the foreman removes his key and moves the other trade keys to the left. If he has any follow-up operations to complete, he will reinsert his key at the proper point in the schedule.

Trades are keyed as follows:

Red—electricians

Green—plumbers

Yellow (MW)—millwrights

Yellow (W)—welders

Yellow (T)—tinners

Yellow (C)—carpenters

Black—service employees

The four colors of keys indicate areas of responsibility for the four maintenance foremen. Thus, each group has its own distinctive key and the foreman of the group may readily see which of the rush jobs require the services of his group.

PRESIDENT Donald S. (Don) Funk . . . "we've celebrated by introducing many cost saving techniques"

GENERAL SUPT. John A. (Johnny) Muir . . . "on a single small part savings run as high as $50 a day"

Key Men Keep Their 50-Year-Old

They do it, as all plant men must, by better management—in this case, good layout, close control of quality, tight scheduling, and low-cost handling

THIRTY DAYS AGO W. S. Wheeler, FACTORY's Chicago field editor, stopped off to see D. S. Funk, president of Sangamo Electric Company, Springfield, Ill. Here's what he learned from Mr. Funk and other key men in Sangamo's production organization. Listen in on their conversation:

WHEELER: I hear Sangamo is celebrating its Golden Anniversary, Mr. Funk. How does it feel to be 50?

MR. FUNK: No different. Fact is, we don't have time to feel any different. This has been one of the biggest years in Sangamo's history. We've celebrated by introducing many cost-saving techniques and methods to try and offset today's higher wages and prices.

WHEELER: Seems to me you may have a story there for FACTORY. Would you mind giving me a little of the background?

MR. FUNK: Not at all—most concerns have had the same problem. We had to increase our production capacity to meet new, postwar demands. And we had to do it with minimum addition of plant facilities. The answer was a new assembly plan, better layout, some new machines, and better methods.

WHEELER: Our readers are always eager to learn about better layout jobs. Could you elaborate on that phase of your plan?

MR. FUNK: That's your question, Harry. Harry Baldwin is most familiar with our layout problems, Mr. Wheeler.

WHEELER: 'Most everybody calls me Bill, Mr. Funk.

MR. BALDWIN: All right, Bill. Perhaps you know we make two standard electric watthour meters and a lot of special meters. We used to produce both standard meters on one assembly line. And we assembled special types on another. Now there are three assembly lines, one for each of the standard meters and one for the specials.

WHEELER: Sounds like real straight-line production.

MR. BALDWIN: Yes, that's what it is. Just a simple application of straight-line principles, with each operator on the line performing a small part of the assembly. Each operator, of course, had to be carefully trained for his particular job. We get greater output with no more effort. And our quality is better, too.

WHEELER: Are you using statistical quality control?

MR. FUNK: Suppose you answer that one, John. John Muir heads up our quality control program, Bill.

MR. MUIR: We start our quality control with the inspection of raw materials, but our greatest savings are made in the manufacture of parts. Fewer rejects of parts and subassemblies, big savings in inspection time, and greater productivity are being realized on many items. Finally, our engineering lab selects at random 0.2% of each type of meter for sampling tests. Meters are checked for correct registration under actual load conditions. Insulation is checked un-

ASST. GEN. SUPT. Harry C. (Baldy) Baldwin . . . "just a simple application of straight-line principles"

PRODUCTION MGR. D. C. (Doc) Blanchard . . . "with the latest and best in materials handling equipment"

Company Young in Ideas

der high voltage. Meters are dissected to check proper assembly and mechanical dimensions. Each inspector gets a periodic report of lab findings.

WHEELER: What about savings?

MR. MUIR: Well, we're getting important cost savings. For instance, on a single small part, they're running as high as $50 a day. Quality control has resulted in many such savings.

WHEELER: All this must also call for the tightest kind of scheduling.

MR. MUIR: Scheduling is a production department function. Let Doc Blanchard tell about that, Bill.

MR. BLANCHARD: "Tight" certainly describes it, Bill. The flow of material from the raw stage to parts, subassemblies, and finished products must meet very close time schedules. We must produce parts and subassemblies in the right quantities, and deliver them at the proper point in the production line at the right time, to assemble the finished product most economically. That's axiomatic.

WHEELER: Who does the deciding?

MR. BLANCHARD: Well, you know, of course, that the production department can schedule and build only what the sales department can sell. So the sales department tells us how many—and we go on from there. Of course, on standard items stocks of finished products help some as a buffer. I don't mind saying we do it all with something pretty close to a minimum of paperwork.

WHEELER: What about materials handling, Mr. Funk?

MR. FUNK: Doc, your department is responsible for materials handling. Suppose you carry the ball on that too.

MR. BLANCHARD: Okay, Mr. Funk. Perhaps I should explain to our friend Bill that Sangamo's manufacturing plant itself isn't located on a railroad siding. But we have two warehouses that are. These warehouses are equipped with the latest and best in materials handling equipment—tramrails, power hoists, fork lift trucks. The tramrails and trucks are a big help in moving the increased volume of raw materials needed for our higher output. Working stocks of materials and supplies are maintained at the factory by daily truck deliveries from the warehouses. Movement of subassemblies to the production line has been improved, too. For example, a new monorail overhead carrier moves assembled glass covers through three buildings, eliminating breakage and saving a good many miles and hours of hand truck transportation.

WHEELER: I forgot to ask about the assembly lines.

MR. FUNK: They're mechanized, of course. Conveyor belt speeds on the three main lines are variable as the production rate is changed. You'll see them when we go out into the plant. But before we go, you might take a look at this "balance sheet of modernization" the boys handed me the other day. This is a prewar-postwar comparison of old and new methods when the lines are working full capacity. It gives you the complete story in a nutshell.

WHEELER: Only a 73% increase in manpower to gain 126% in production! Congratulations, Mr. Funk. Thanks for all your help. And best of luck to Sangamo in its second 50 years. The first 100, if I may coin a phrase, are always the hardest.

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

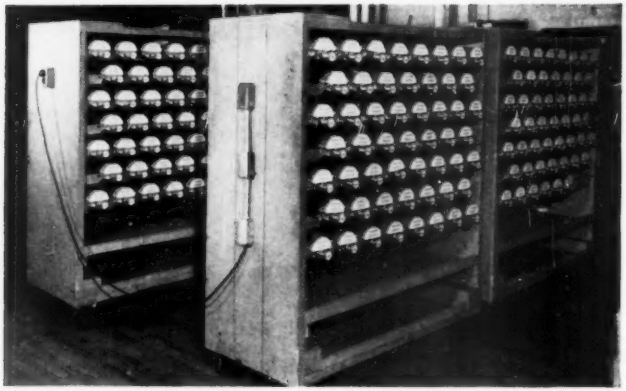
Cartoon Contest Shows What NOT to Do

Prizes for the most accidents and near-accidents were offered in an unusual safety contest at the Portland (Ore.) Gas & Coke Company. But the accidents were on paper only.

A large cartoon of the company's gas manufacturing plant showed more than 200 men dangerously at work. One was entangled in a high-power electric cable. Another carrying a high load walked blindly toward a deep hole. A carelessly thrown brick was hitting another on the head, and a welder was at work beside a tank of benzol.

The aim of the contest was to identify the largest number of violations of safety rules.

The company mailed the cartoon and rules of the contest to the employees' homes. Members of their families were allowed to help.



Wired Test Trucks Eliminate Two Handlings

Specially wired test trucks for the "time-run test" on a time-switch movement assembly have eliminated two costly handlings at Sangamo Electric Company, Springfield, Ill.

Old method: The last operator on assembly line hung the assembled movement on a truck having a capacity of 108 units. The truck was then pushed to a time-run testing rack. Each movement assembly was removed from the truck, motor leads attached, and the unit hung on the test rack. After the test the unit was removed from the test rack, leads disconnected, hung on the truck, and then transported back to the assembly line.

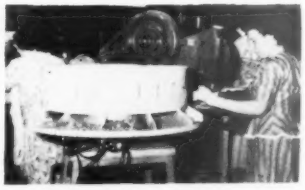
New method: Each test truck has been wired for 106 open sets of electric leads connected to one power source. The last operator on the assembly line connects motor leads of the assembled movement to leads on the truck, then hangs the unit on the truck. The truck is pushed to the testing station, the power line is plugged in, and the switch is then turned on. After the test, the switch is turned off, the power line is unplugged, the individual motor leads disconnected, and the truck transported to the assembly line.

Results: All double handling of movement assemblies, involving their transfer from assembly trucks to test racks and return, has been eliminated. The time of one man for an eight-hour day for transfer operations has been saved and one less truck is required. Also, elimination of the test rack has saved 130 square feet of floor space.

Automatic Ejectors Save 25 Per Cent of Work Time

Automatic ejectors eliminate a complete manual operation in the induction heating and upsetting of connecting rod bolts at the Chevrolet plant of General Motors, Bay City, Mich. Before, the operator had to remove the finished bolt with tongs at the final station.

All the worker has to do now is load the first station of the machine. The machine then automatically indexes to the second station, where the bolts are induction-heated, and to the third station, where the rod is upset to form the connecting rod bolt head. At the fourth station, two finger hooks descend and grip each bolt. As the two bolts are lifted from the fixture, the center lug of the finger hook kicks the bolt forward into a tote box. The ejectors save better than 25 per cent of the labor time.



Rotary Parts Bin Reduces Assembly Cost

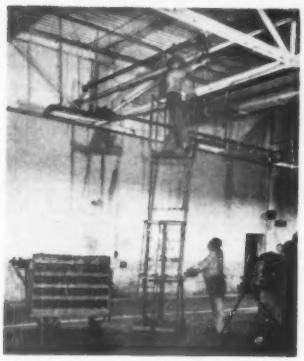
A. S. PEDERSON, chief industrial engineer, Zenith Radio Corporation, Chicago

Indexing with each stroke of the riveting machine, this rotary bin

brings small parts within easy reach of the operator as needed. The unit minimizes fatigue and has boosted production 25 per cent on four riveting operations.

Mounted on a solenoid-controlled, air-operated dial feed table, the bin is used to assemble from 4 to 24 parts. At the end of each cycle it automatically returns to starting position. A tripping device is provided so the operator can reset either bin or machine if the machine misses a rivet or fails to trip the bin's indexing mechanism.

The indexing units cost $350 each, but resultant savings will pay for them in about two months.



EXPANSION PLATFORM LADDERS are used by all divisions of the maintenance department at the Allison Division, General Motors Corporation, Indianapolis. The ladder is adjustable to any required height. Plumbers, painters, and electricians can do their work safely and easily with the new ladder.

Equipment Value Signs Build Cost-Consciousness

The use of equipment value signs by Stewart-Warner Corporation, Chicago, has given a real lift to the company's drive to develop cost-consciousness on a plant-wide basis. As a result, department heads and employees enjoy a better understanding of their responsibilities for stockholders' investment and employees take a more personal interest in the care and operation of their machines.

First used in connection with observance of open house at the main plant some months ago, the signs were so enthusiastically received that they have been made a permanent feature of all factory departments. They are mounted in heavy traffic areas, usually main aisles. To highlight the role of department supervisors in securing most effective use of equipment, the names of the foreman and assistant foreman are also prominently displayed.

To help carry out the theme of cost-consciousness, each foreman receives a monthly statement showing his department's operating costs in detail. This information serves two purposes. It helps the foreman to control costs by pointing out weak spots. It also provides facts which he can talk over with his employees to enlist their interest and active participation in cost reduction.

Conveyor Facilitates Third-Floor Storage

Installation of a belt conveyor has speeded storage of bags, raw wool unloaded from trucks and railroad cars at the Botany Mills, Inc., Passaic, N. J. Formerly, it took all day to empty one car and move bags by elevator to a third-floor storage space. Now, eight cars can be unloaded in the same period of time.

Since bags and bales vary in size, it was a problem to get bags and bales up to the storage area and down again when needed for production.

A 48-in. rubber-top belt conveyor was installed, with an angle of incline of 25 degrees, which is driven by a 5-hp., reversible, gear-head motor.

A covered unloading platform was built adjacent to the base of the conveyor. It was aligned with the railroad track on one side and the mill yard on the other.

This arrangement makes it possible to unload both trucks and railroad cars directly to the belt conveyor.

Models Used to Crack Shipping Problems

Scale models of automobile components and packing cases to ship them in made it possible to predetermine efficient, inter-plant transportation methods at the General Motors-Holden plant in Melbourne, Australia.

This main plant was faced with the problem of setting up a standard packing and shipping process before actual production of parts and their assembly had gotten under way. Make-up of the shipments was a problem. Should parts come in single units, subassemblies, or assemblies? Furthermore, different types of transport—rail, motor, and sea—had different storage capacities and handling equipment. Standardized dimensions and maximum

weights would have to meet conditions of all three economically. Finally, there was a timber shortage, so wooden cases had to be made returnable.

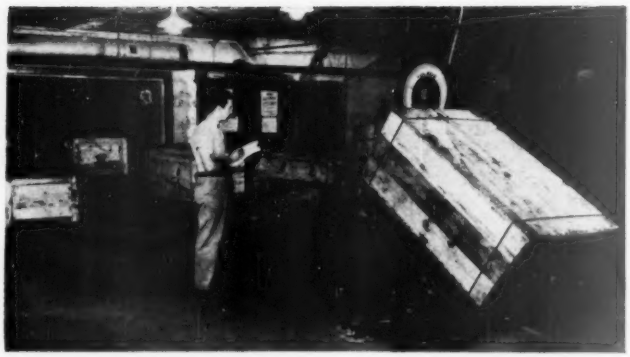
Since the components themselves were not available, scaled models were sculptured from engineering drawings and cast in the foundry. Models were made only of those units which were considered limiting factors in packing—engine assembly, front axle, rear axle, radiator, steering gear, and tailshaft. After transport studies indicated optimum packing case dimensions to be 90x84x84 inches and maximum gross weight to be two tons, model cases were made. Plant engineers then packed the scaled components into the cases to discover the most economical arrangements.

It was decided to make wooden cases in sections, so they could be knocked down when empty and returned flat to the sender.

When production got underway, the packing and shipping system was already completely organized. Full-size parts and components were boxed as the models were.

City Fire Department Checks Plant Equipment

A monthly inspection is made jointly by the Peoria, Ill., fire department and the plant fire chief of the fire protection and extinguishing equipment of R. G. Le Tourneau, Inc. This inspection includes testing of fire hydrants on the grounds. All hydrants are protected from traffic damage by semi-circular guard posts. Not only is there good cooperation between the city and industrial fire departments, but also never once has a piece of equipment failed to operate when needed.



Chute and Conveyor Simplify Storage of Heavy Cases

A saving of 160 man-hours per week was made at the Botany Mills, Inc., Passaic, N. J., when a chute and conveyor were installed. The system facilitates temporary storage of incoming wooden cases, each containing about 400 pounds of yarn, and aids delivery of the yarn to processing areas.

Formerly, elevators could take only 2 cases at a time, either down to the cellar for storage, or back up again to the department needing yarn. These operations required strenuous manual handling and long waits for elevator service.

Now cases are delivered by electric trucks to a steel chute leading to the cellar, and they slide down onto a section of roller conveyor equipped with a scale. In removing the heavy cases from this roller section after they were weighed, steel straps often snapped and cases were damaged. So a special device was designed that upends cases without injuring them. Merely by pressing a foot pedal, the boxes are released from the conveyor stop and up-ended on the floor ready for transportation to temporary storage by dolly truck.

When needed for processing, the yarn is delivered by truck to a metal slat conveyor, which lifts it to the next floor and carries it onto a gravity roller section extending into the middle of the room.

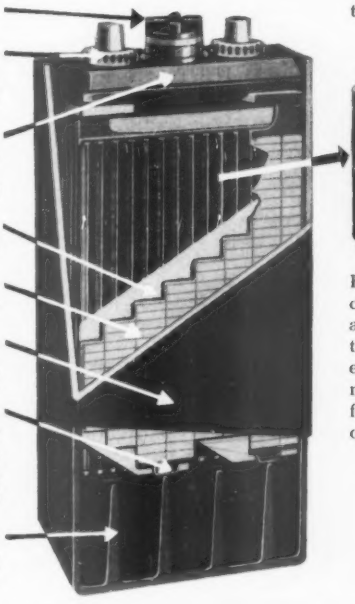
Workers Fine Themselves for Poor Housekeeping

Fines encourage better housekeeping in the experimental machine shop at the South Wind Division of Stewart-Warner Corporation, Indianapolis. Employees keep tabs on one another; anyone in the department caught dropping paper, matches, or cigarette butts on the floor is fined a penny. Money collected will help finance a holiday party for machine shop employees and their families. The fines were originated and voluntarily put into practice by employees themselves.

EXIDE-IRONCLAD BATTERIES ARE DIFFERENT!

They are specially designed to provide years of dependable service in all MOTIVE POWER WORK

Storage batteries are called upon to perform many tasks. No single type of battery is adequately suited to all. To meet these numerous requirements, Exide engineers have developed special types, to fit each application.* Among these several types is the specially designed Exide-Ironclad Battery. Details shown below.


VENT PLUG specially designed to prevent escape of electrolyte.
GREASE SEAL RING NUT holds battery elements securely in place . . . prevents creepage of electrolyte . . . keeps tops clean and dry.
SEALED CELL COVER flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.
SEPARATOR of high porosity, specially treated to last the life of the battery.
NEGATIVE PLATE made extra heavy and built to match the long life of the positive plate.
JAR made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage.
FEET. Internal short circuits practically eliminated because the two feet on negative plate rest on different ribs from those of the positive plate, and because separators extend below both plates and rest on all four ribs.
RIBS support all plates and separators. Their height provides generous sediment space so that internal cleaning is unnecessary.

DIFFERENT IN DESIGN
DIFFERENT IN CONSTRUCTION
DIFFERENT IN SERVICE QUALITIES

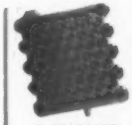
Chief among these differences is the unique positive plate, an exclusive Exide feature.

EXIDE-IRONCLAD POSITIVE PLATE

Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from battery electric industrial trucks — high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service.

*



DESIGNED FOR STATIONARY USE

The Exide-Manchex Battery has the manchester type positive plate with the lead button construction. Specially designed for stationary use in many classes of industry.

DESIGNED FOR AUTOMOBILE USE

The Exide Automobile Battery has plates of staggered grid construction. Specially designed for use in automobiles, trucks, buses, aircraft and numerous other applications.

"Exide" and "Exide-Ironclad" *Reg. Trade-marks U. S. Pat. Off.*

1888... DEPENDABLE BATTERIES FOR 61 YEARS...1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

management data sheet 49

Inventory Control Fundamentals

1. Purpose of Inventory Control

a. Inventory control is a tool of management which is used to maintain an economic minimum investment in materials and products, for the purpose of obtaining a maximum financial return from the investment.

2. Fields of Application

a. In theory, inventory control is essential in all industrial enterprises.

b. In practice, the value of inventory control increases in direct relation to the total unit cost of the product.

3. Inventory Turnover

a. Under normal operating conditions, other things being equal, net profits are proportional to the rate of inventory turnover.

b. Over-all inventory turnover is the number of times the inventory of raw materials, work-in-process, and finished goods and supplies is sold and replenished during a year.

c. Over-all inventory turnover is determined by dividing the total annual cost of sales by the average monthly inventory of raw materials, work-in-process, finished goods and supplies, at cost.

d. Raw materials inventory turnover is determined by dividing the total annual cost of raw materials which have gone into process by the average monthly raw materials inventory, at cost.

e. Work-in-process inventory turnover is determined by dividing the total annual cost of finished goods completed by the average monthly work-in-process inventory, at cost.

f. Finished goods inventory turnover is determined by dividing the total annual cost of sales by the average monthly finished goods inventory, at cost.

g. Supplies inventory turnover is determined by dividing the total annual supplies expense by the average monthly supplies inventory, at cost.

4. Inventory Quantities

a. Inventory control of standard items of raw materials, finished goods and supplies, is secured through the proper use of minimum, maximum, order point, and standard order quantities.

b. "Minimum quantity" is the lower limit of the inventory of a specific item, and represents a margin of safety which should be used only in the case of emergency.

c. "Maximum quantity" is the upper limit of the inventory of a specific item, and represents the largest economic quantity which should be carried in stock.

d. "Order point" is the inventory quantity of a specific item which is required to insure against exhaustion of the supply during the interval between the placement of an order and delivery of the order.

e. "Standard order" is the quantity of a specific item to be purchased or ordered when the inventory reaches the order point.

5. Raw Materials Inventory

a. Raw materials include all purchased items which enter directly into the manufactured product.

b. Factors which control inventory quantities of specific items of raw materials include:

1) The volume of customer orders for stock products.

2) Specific customer orders for any special products.

3) Purchasing lead time, representing the average time interval between issue of the purchase order and receipt of the purchased item.

c. Under rapidly changing conditions in a competitive market, particularly when seasonal products are involved, inventory quantities may be reviewed at three-month intervals, on the basis of experience during the previous three months.

d. "Minimum quantity" may equal "minimum consumption by stock and special products during the period of one week."

e. "Order point" may equal "minimum quantity" plus "average weekly consumption by stock and special products, multiplied by purchasing lead time, expressed in weeks."

f. "Standard order" may equal "order point" minus "minimum quantity," when "purchasing lead time" is four weeks or more.

g. When "purchasing lead time" is less than four weeks, "standard order" may equal "aver-

Continued on page 126

Prepared by Bruno A. Moski, Plant Manager, The American Paper Goods Company, Kensington, Conn.

AO DURALITE Goggle

Gives Your Workers INDIVIDUAL PROTECTION for Each Eye

Year in and year out the AO 301A Duralite Goggle retains its popularity with grinders, chippers, riveters, machine and hand tool men because:

(1) It's light in weight for maximum comfort.

(2) Its individual eyecups are *molded to fit the contour of each eye* with smooth, rounded edges. What's more, there's ample ventilation to retard fogging of lenses.

Your nearest AO Safety Products Representative can supply you with this popular goggle which protects from particles striking from every direction.

QUICK FACTS:

Eyecups are low set for broad working vision—won't conduct heat or electricity.

Bridge is ball-chain type, easily adjusted and insulated with curved tubing.

Aluminum lens retaining rings won't corrode. Slots provide added ventilation.

One-piece rubber headband, easily adjusted.

50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

Rubber cushions available around edge of eyecups at slight extra cost.

American Optical
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

management data sheet 50

Inventory Control Fundamentals

Continued from page 124

age weekly consumption by stock and special products, multiplied by four weeks."

h. "Maximum quantity" may equal "order point" plus "standard order."

6. Work-in-Process Inventory

a. Work-in-process inventory includes all raw materials upon which manufacturing operations are being performed, prior to actual completion as finished goods.

b. Factors which control inventory quantities of specific items of work-in-process include:

1) Production schedule requirements, specifying the quantity of finished products required per day or week.

2) The cost of setting up machines and tools for specific manufacturing operations.

3) Average time required to transfer materials from one manufacturing operation to the next.

c. Production schedule requirements represent the most important factor, and the requirements are generally broken down into lots, as outlined in Management Data Sheets Nos. 28 and 29, "Production Control Fundamentals," May, 1948.

d. The cost of setting up machines and tools for specific manufacturing operations is a factor in the determination of lot sizes, generally on the basis of an 8-hour run on the operation requiring the greatest time per piece.

e. The average time of transferring materials from one manufacturing operation to the next has the effect of increasing work-in-process inventory beyond the quantity represented by the normal daily capacity of equipment used for all manufacturing operations.

7. Finished Goods Inventory

a. Finished goods include all completed manufactured products.

b. Factors which control inventory quantities of specific items of finished goods include:

1) The volume of customer orders for stock products.

2) Manufacturing interval, representing the average interval between issue of a production order and completion of the products as finished goods.

3) Specific customer orders for special products awaiting shipping instructions.

4) Substandard or discontinued products.

c. The volume of customer orders for stock products and the manufacturing interval represent the factors which permit consideration of minimum, maximum, order point, and standard order quantities, determined on the basis of experience during the previous three months.

d. "Minimum quantity" may equal "minimum customer orders for stock products during the period of one week."

e. "Order point" may equal "minimum quantity" plus "average customer orders for stock products per week multiplied by the manufacturing interval expressed in weeks."

f. "Standard order" may equal "order point" minus "minimum quantity," when "manufacturing interval" is four weeks or more.

g. When "manufacturing interval" is less than four weeks, "standard order" may equal "average customer orders for stock products per week multiplied by four weeks."

h. "Maximum quantity" may equal "order point" plus "standard order."

i. In the case of specific customer orders for special products, the principles applying to inventory quantities of stock products should be considered before manufacturing in advance of specific instructions.

j. In the case of substandard or discontinued products, definite sales efforts should be made to dispose of the products, at decreased prices, as rapidly as possible.

8. Supplies Inventory

a. Supplies include all materials which are essential to carry on manufacturing operations, but which do not become a part of the manufactured products.

b. In general, control of supplies inventory should not represent a serious problem, because of the relatively smaller financial investment in supplies, as compared with raw materials and finished goods.

c. When improved control is desired, the principles affecting raw materials should be considered.

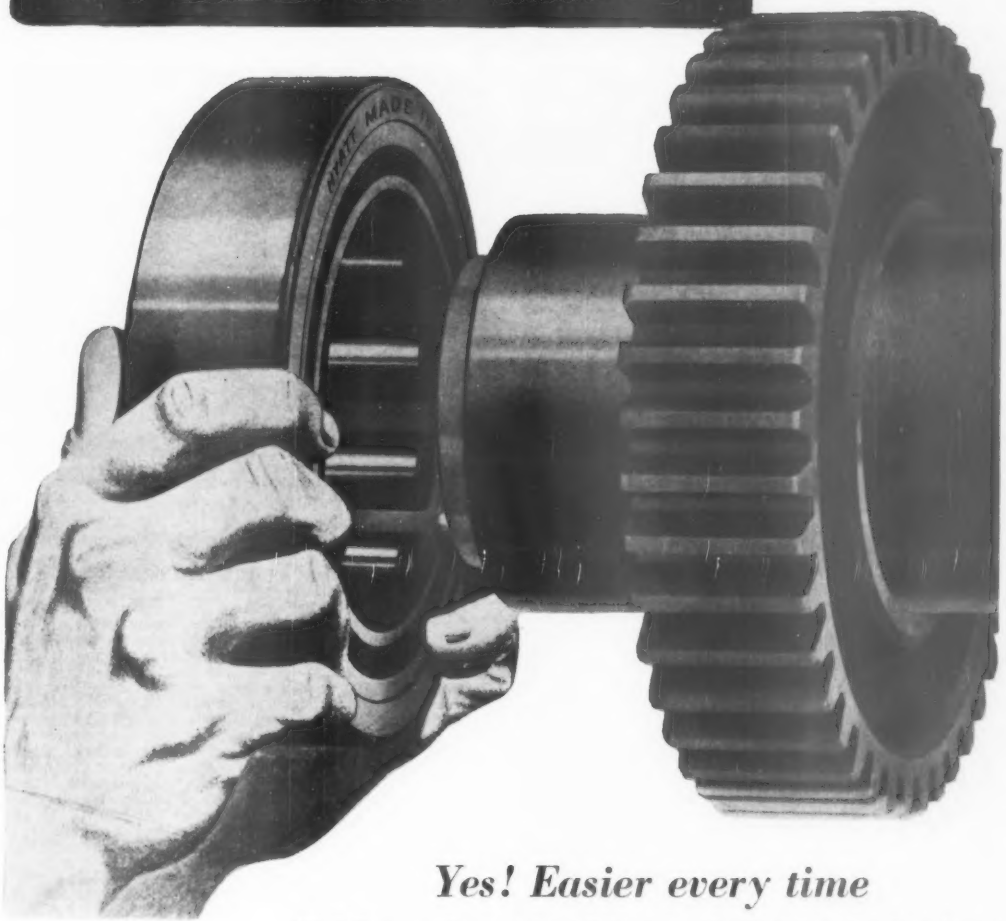
9. Summary

a. The rate of inventory turnover is the most important index to the effectiveness of an inventory control plan.

b. When the average rate of inventory turnover for a given industry is known, the ability of a specific enterprise to operate at a rate higher than the average is an important competitive advantage, resulting in definite financial progress.

Prepared by Bruno A. Moski, Plant Manager, The American Paper Goods Company, Kensington, Conn.

"It's easier with HYATTS"



Yes! Easier every time

Why? Because, the straight radial construction and complete interchangeability of bearing parts in Hyatt Hy-Load Bearings make it easier for you.

How? Well, for example, you can mount separable bearing parts on one subassembly and install the balance of the bearing in another, then, bring the subassemblies together completely confident that all bearing parts will fit perfectly.

And there will be no adjustments, no matching, and no blind fitting. There will be nothing to slow down or complicate your final assembly operation.

With more than fifty years of accumulated bearing application experience, we believe we can help you to make real savings in assembly costs. Let us show what we can do for you. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

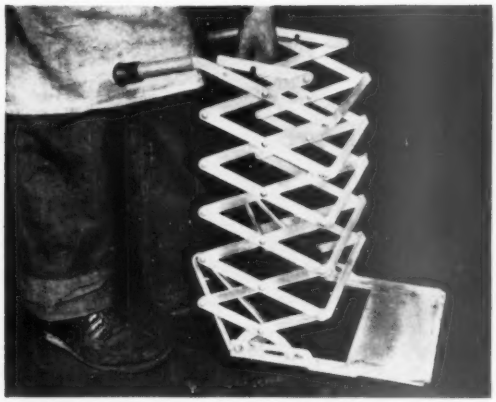
WRITE

For our interesting and informative booklet "Guide Lines for Engineers and Designers".

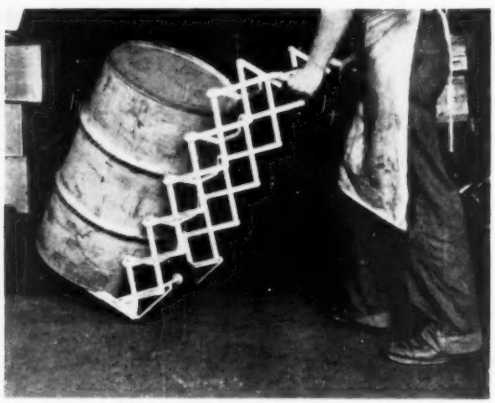
HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT BRIEFED HERE—FOR THE CONVENIENCE OF

1 STACKING these collapsible hand trucks is easy, as they are made with hinged sections. When . . .



2 OPENING the trucks to their full 42-in. height, the loading platform extends for . . .



3 HAULING boxes, bundles, or bales on easy-riding, oil-less-bearing, heavy duty rubber wheels.

Fold-Up Hand Truck Saves Space

You can stack up ten of these Fold-A-Way hand trucks in the same space ordinarily taken up by two rigid-type trucks. Or you can stick them away under the workbench, the truck seat, or in the stockroom under the shelves. The over-all size when folded is only 21x15½x9 inches.

When you need to move some bulky load, you can pull out the hinged sections like an accordion, with an easy lifting motion. The truck extends to a height of 42 inches. It is lightweight (only 25 lbs.), but will carry up to 700 lbs. Loading platform measures 7½x16 inches. It will handle barrels and bulky cases without strain, the maker claims.

Two models are available: straight back, for handling boxes, bundles, or bales; and a curved-back type, for barrels, kegs, or drums, as well as straight packages.

Both types are equipped with a "Stairway-Slider" glider bar which slides the load up or down stairs or over ramps or curbs without bumping. Oilless-bearing heavy-duty rubber wheels are placed on the inside of the framework to keep them from snagging passing objects as you roll the truck along.

Business Equipment Specialists, 19 W. 44th St., New York 18.

Portable Belt Sander

Here is an electric belt sander with its own cooling system. It is made with open-end construction, and its maker says that the belt motion creates air currents to blow the heat away. It can be used on wood, metal, or stone, and the 4½x26-in. endless belts come in all grades and grits. There is also a cloth polishing belt. Tool is available with or without a dust collector.

Independent Pneumatic Tool Co., 175 N. State St., Aurora, Ill.

Bronze Gate Valves

Line of bronze gate valves carries a rated working pressure of 200 pounds of steam at 550 deg. F, or 400 psi. with water, oil, and gas non-shock. They are of the union-bonnet, screwed-end type, suitable for wide-open or closed service on lines carrying water, oil, gas, and steam, or other services where bronze valves are needed.

They are made with solid-wedge rising stem, double-disc rising stem, or solid-wedge nonrising steam design. All have tapered seats and copper-nickel alloy wedges.

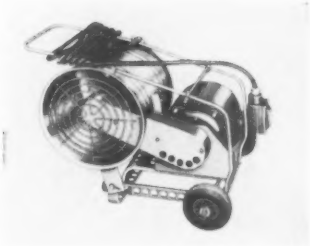
The Ohio Injector Co., Wadsworth, Ohio.

Thread-Sealing Compound

You can carry this stick-form sealing compound in your pocket or tool kit. Metal cap keeps out dirt and prevents compound from rubbing off on your clothes.

Called Thread-Tite, you can use it on any metal, and its maker says it makes a positive seal against gases, brines, acids, water, steam, or ammonia at high and low temperatures and pressures.

Armite Laboratories, 6609 Broad St., Los Angeles 1.



Portable Ventilator

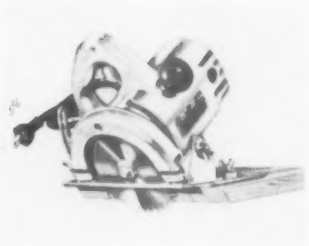
Roll your weather right where you want it with this portable ventilator. It provides either draw-through or blow-through action, is powered by either a gasoline engine or an electric motor. Canvas duct, 14 inches in diameter, is collapsible.

Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8.

Gear Head Motors

You can use these motors for a variety of electrically activated equipment, ranging from timing devices and conveyor drives to door openers. Ratings range from 1/200 to 1/3 hp., reduction ratios from 6:1 to 900:1, output torques from 1 inch pound to 500, speeds, 833 to 8 rpm.

Robbins & Meyers, Inc., Springfield, O.



Portable Electric Saw

This 6-in. saw, Model 660, cuts wood, asbestos, metal, masonry. It is balanced for one-hand operation, has a 1-hp. motor. Depth gage adjusts up to a 2-in. straight cut; rip guide controls long cuts. You can miter up to 45 degrees, with a bevel cut of $1\frac{3}{8}$ inches.

Milwaukee Electric Tool Corp., 103 N. Water St., Milwaukee 8.

IN THIS ISSUE

Air Conditioning, Heating, and Ventilation—pp. 129, 134, 184

Electrical Equipment—pp. 129, 132, 136, 138, 140, 142, 144, 146, 150, 152, 160, 162, 174, 176, 180, 182, 186, 275

Maintenance Tools and Supplies—pp. 128, 129, 136, 143, 147, 148, 158, 160, 164, 166, 170, 180, 182, 184, 190, 275

Materials Handling—pp. 128, 129, 130, 132, 134, 138, 144, 150, 154, 156, 158, 163, 166, 170, 172, 178, 188

Mechanical Power Transmission—pp. 132, 144, 162, 164, 168, 172, 174, 176, 186

Liquid-Handling Equipment—pp. 152, 154, 156, 166

Sanitation and Safety—pp. 134, 143, 146, 148, 170, 188, 190

Plant Housekeeping—pp. 136, 168

Power Generation—pp. 160

Valves, Fittings, and Pipe—pp. 128, 140, 142, 147, 163, 172

Paints and Painting Equipment—pp. 138

Cable-Splice Housing

Plastic cable-splice housing does away with wrapping operations, provides a durable watertight seal. You can use it for both aerial and underground installations, with either rubber or neoprene cable.

Its main part is a pipe made of synthetic rubber and thermoplastic resins. This pipe fits over the cable joint, with two rubber seals. Threaded plastic caps on each end grip the cable. The housing is resistant to acids, oils, alkalis, is unaffected by temperatures ranging from -4 to 180 degrees F. It has low moisture absorption, high electrical insulating value, according to the maker. It is made in two sizes, 1.5- and 2-in. inner diameter, for 1- and 1.5-in.-thick cable.

U. S. Rubber Co., Rockefeller Center, New York 20.

Metal Detector

This electronic metal detector is adjustable, works in conjunction with any belt conveyor on nonmetallic materials. You can regulate the sensitivity of the search coil so that either small or large pieces of metal will be detected, or both.

When foreign metal is present, the device automatically stops the belt and operates a mechanical, audible, or visual signal, such as a reject arm, horn, light, or marking device. The detectors are custom built, and the signal or marking selected depends upon the application involved. The unit operates on belt speeds up to 900 feet per minute.

Eriez Mfg. Co., Erie, Pa.

Roller Conveyors

Light-duty tubular gravity conveyors will move unpackaged as well as packaged items. They are designed to support 660 pounds on a 10-ft. section. Rollers are assembled in the frame so that on one side they are higher than the frame, letting you handle units wider than the conveyor. If you invert it, the roller surface is below the frame, which acts as a guard rail.

Standard widths are 12, 15, or 18 inches; lengths, 5 and 10 feet; 45- and 90-deg. sections permit movement around corners.

Speedways Conveyors, Inc., 1271 Niagara St., Buffalo 13, N. Y.

Voltage Stabilizers

Multiple-unit-type voltage stabilizers are made for capacities in excess of 2 kva. The sections, of 500- or 625-watt capacities, are built up on rails, connected in parallel with input and output connections located in a separate junction box. This lets you put together any rating you need, up to capacities as high as 10,000 watts, for such applications as telephone switchboards or any type of motor that requires a stable input voltage.

Raytheon Mfg. Co., Dept. 6460-NR1, Waltham 54, Mass.

Continued on page 130

1 TO LIFT drum, lock top and bottom to truck. Now it's ready . . .

2 TO MOVE to location. Rock it over, roll it to the job in position . . .

3 TO DISPENSE the contents from the side into smaller containers.

Rocker-Type Truck Transports, Positions Heavy Drums

Here's a simple way to move and position heavy drum loads of paint, chemicals, oil, or any type of liquid or semi-liquid material so that you can dispense the contents right where you need to use it. It's called the Rock-A-Drum. You just place one end of the truck so that the safety catch on the nosepiece engages the bottom chime of the drum. Then lock the top chime to the truck platform with the turn screw provided. Rock the drum and truck as a unit into reverse vertical position on the curved frame, and roll it away on the 3-in. wheels to the location most convenient to the job.

The truck is built to hold the drum 15 inches off the floor, so that you can drain the contents from the side into smaller containers for use on the job. This way you can have your reserve supply right on hand at all times, without having to run back to the stockroom for refills.

Morse Mfg. Co., Inc., 122 Dickerson St., Syracuse 2, N. Y.

EQUIPMENT PREVIEW: Highlights of important new items to be described more fully next issue

Air-Operated Paint Pump—The Paintmaster pumps paint directly from the original containers to the spray head. No air pressure reaches the paint itself, therefore no bubbles or pinholes in the finished surfaces. The agitator keeps viscosity uniform.

Gray Co., Inc., 50 11th Ave. N.E., Minneapolis 13.

Disposal Unit for Fluorescent Tubes—Both the broken glass and the beryllium in worn-out tubes are handled safely in this disposal unit. It's made of steel, operated by one man, and destroys a tube in less than ten seconds.

Standard Safety Equipment Co., 232 W. Ontario St., Chicago 10.

Unit for Tempering Make-Up Air—Ventilating systems impose heavy loads on the heating plant in cold weather. All the fresh air that comes in to replace air drawn out must be warmed. This unit is designed to temper make-up air to room temperature before it is discharged into the working area.

Prat-Daniel Corp., E. Port Chester, Conn.

Battery-Operated Platform Truck—The Hustler is a lightweight truck with the batteries on one side of the 56-in.-long platform so that you can carry long loads on the other side. The padded seat is located on the cover of the battery box.

Baker Ind. Truck Div., The Baker-Raulang Co., 1250 W. 80th St., Cleveland 2.

Air Conditioner

Designed to control temperature and relative humidity, air conditioning system will hold constant conditions, or vary them as needed. Its maker claims it will provide dry air at normal atmospheric temperatures with little or no refrigeration required.

The apparatus is enclosed in a casing through which air is driven by fans. The air is filtered, then dehumidified by passing through a spray of hygroscopic chemical, called Hygrol, that absorbs air-borne moisture. Cooling coils are located in the same chamber. The air stream then passes through moisture eliminators, out into space being conditioned.

The absorbent liquid spray falls into a tank at the base, then is reconditioned, and recirculated. You can use the same equipment to provide winter air conditioning by installing a tempering coil at the outdoor intake, an humidifier, and a reheat coil above the eliminators.

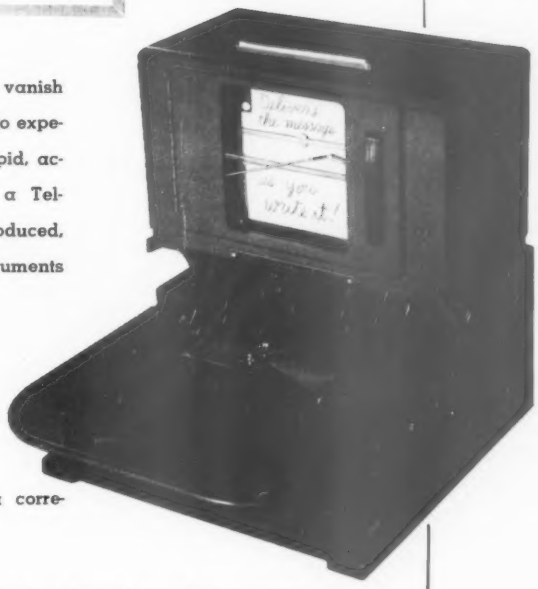
Its maker says that it is suitable for use in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, for laboratory control, and for general comfort.

Niagara Blower Co., 405 Lexington Ave., New York 17.

Continued on page 132

EXPEDITER EXTRAORDINARY!

TelAutograph Telescribers Send Handwritten Messages Via Wire Instantly to one or More Points . . . From Dept. to Dept. or Bldg. to Bldg.



Intra-plant communication problems vanish when TelAutograph Telescribers are used to expedite orders and messages. Here is THE rapid, accurate method. A message written on a TelAutograph Telescriber is immediately reproduced, in the sender's own handwriting, on instruments at other locations.

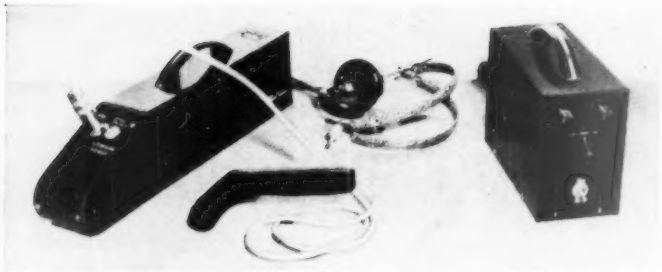
No delays. No disputes. One writing contacts all concerned. Both sender and recipient have a permanent record of the message. The resulting increase in efficency means a corresponding reduction of operating costs.

For further information about a TelAutograph Telescriber System to fit the needs of your organization write for Literature F.

TelAutograph CORPORATION

16 WEST 61st STREET NEW YORK 23, N. Y.

"Handwritten Messages Deliver Themselves... While You Write."



ELECTRONIC FAULT FINDER is packed in a case so that you can take it right out in the field to locate defective points in wire, cable, metal pipe, or other conductor, in any type of electrical installation. The device is a self-contained unit, consisting of a signal generator, a portable probe, receiver, and headphones.

Portable Electronic Fault Finder Locates Circuit Breaks in Field

This instrument was designed to locate grounds, shorts, open circuits, radio interference, or breaks in conduit or pipe lines. Its maker says that you can use it on any type of electrical installation or apparatus, and that you don't need technical training to operate it.

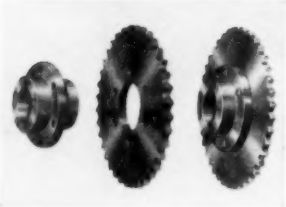
Called the Electracer, it generates a signal which runs along through the wire, pipe, or other conductor being traced, even though conductor is buried underground, or lost in a maze of other pipes or wires. Signal is picked up through the probe and heard in the headphones.

The Special Products Co., Silver Spring, Md.

Electrical Tape

Plastex electrical tape is thin and elastic so that it will conform readily to irregular surfaces. It resists water, oil, acids, alkalis, and corrosive chemicals, and its maker says it has high dielectric resistance and stands up under severe conditions. It is put up in a screw-cap container holding five rolls.

Van Cleef Bros., Inc., 7800 Woodlawn Ave., Chicago 19.



Demountable Sprockets

You can get a wide range of speed ratios from this line of demountable hub roller-chain sprockets, states the maker. They range in pitch from ½ through 1¾ inches.

The sprocket is made up of a steel plate to which a machined cast-iron hub is attached by heat-treated cap screws. The bolt holes in the hub are threaded. You can obtain hubs with bores in increments of 1/16th inch between the minimum and maximum bore sizes—½ in. to 7 7/16 inches. Bolt holes in both sprocket plates and hub are jig drilled to permit interchangeability.

Fort Worth Steel & Machinery Co., 3600 McCart St., Ft. Worth, Tex.

Mechanized Hand Truck Rides on Four Pneumatic Tires

You can ride on the pedal platform of this mechanized hand truck. Called the Xpediter, it will carry up to 600 pounds. The 3½-hp., 4-cycle, air-cooled engine is equipped with an air cleaner and a sparkproof muffler. You can control the speed, forward, and reverse with a single foot pedal.

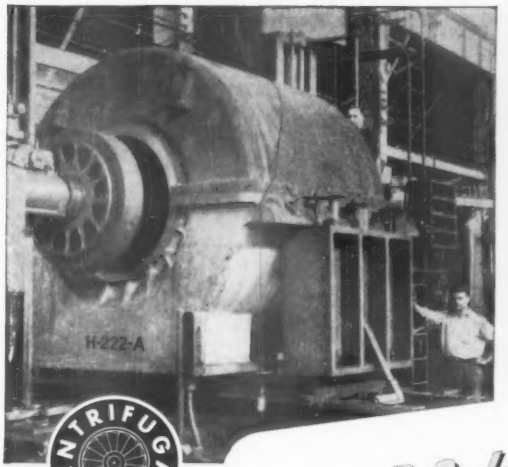
Cruising speed is 6 mph.; the speed is controlled by the engine governor after throttle is set to the desired rate. This governor automatically opens the throttle to meet unusual conditions, giving additional power for grades, heavy loads, or going over obstructions.

The truck weighs 690 pounds. It has a 34-in. wheel base, an over-all length of 72 inches. Front wheel steering makes possible an inside turning radius of 24 inches. The four wheels are equipped with 16x4.00-8 pneumatic tires mounted on wide-base rims.

The standard utility front carrying frame is shown here: this has a removable front plate for barrel carrying. Other models are also available, equipped with a hydraulic fork, lift, or clamp.

Young Iron Works, 2951 First Ave. S., Seattle, Wash.

Continued on page 134



R-C Centrifugal Blower, with capacity of 69,300 CFM, being built in our plant.

R-C Rotary Blower, type RCD, capacity 6,200 CFM.

LET *R-C dual-ability* SETTLE THE QUESTION

If you are in doubt about whether Centrifugal or Rotary Positive units will do the best job of handling gas or air on any specific application, you can obtain an unbiased answer from R-C *dual-ability*.

Because we build both types, in wide ranges of sizes and designs, we can make sound comparisons and can recommend without prejudice the units whose capacities, pressures, drives and other characteristics are matched to the job, to deliver the best performance.

Only Roots-Connersville gives you this *dual choice*. It comes from 95 years of designing and building gas and air handling equipment, exclusively.

ROOTS-CONNERSVILLE BLOWER CORPORATION
912 Central Avenue, Connersville, Indiana

FOR HANDLING GAS OR AIR, CALL ON *R-C dual-ability*

No other manufacturer offers such a wide choice of equipment for handling gas and air:

Centrifugal and Rotary Positive Blowers, Exhausters and Boosters

•

Rotary Liquid and Vacuum Pumps

•

Positive Displacement Meters

•

Inert Gas Generators

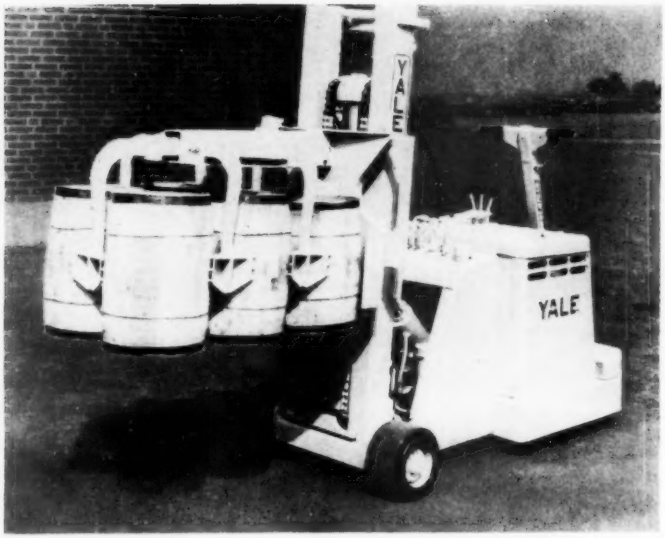
•

You can depend upon the value of R-C *dual-ability*, because handling air and gas has been our *exclusive* business for 95 years.

★ ★ ★ ★ **ROOTS-CONNERSVILLE** ★ ★ ★ ★

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

★ ★ ONE OF THE DRESSER INDUSTRIES ★ ★



Hydraulic Lifting Device for Cylindrical Containers

Here is a truck with fingers. It will pick up kegs, drums, barrels or cylindrical cardboard containers, without pallets or skids. It will tier from 1 to 6 containers 2, 3, and 4 layers deep. It is hydraulically operated, and eliminates both manual handling and the need for large numbers of pallets when shipping or storing quantities of oils, batching ingredients, nails, bolts, screws or other bulk materials.

The truck itself is a battery-powered, tilting-fork model Worksaver. It weighs 3845 pounds, travels 3 mph. with no load, 2 mph. under full load. Levers located at the front of the truck operate the hydraulic fingers; lifting and lowering levers also are in front. Controls for forward and reverse speeds are on the handle. When this handle is in either vertical or horizontal position, the brake is automatically applied to prevent accidental movement.

Over-all height is 83 inches; it will lift 15 feet per minute with a 3,000-lb. load.

The Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24.

Portable Electric Unit Heater

Wind-tunnel design of this Thermalink Aeroheat unit circulates warm air at a rate of more than 200 cubic feet per minute, according to the maker. It has a motor-driven fan, and the entire front and back areas are wide-open unobstructed grilles. During the summer, you can use the unit for cooling.

The 1320-watt, 115-volt a.c. model is compact, stands on a tip-proof, stable base, and has either a carrying handle or a wall-mount bracket. Other models for 2000 watts, 230 volts a.c., are available with or without built-in thermostat. These are suitable for heating larger rooms, or for use where the temperature must be controlled.

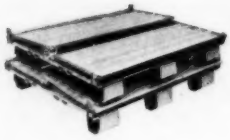
Electro-Therm, Inc., Silver Spring, Md.

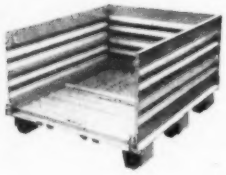
Nonskid Steel Floor Plate

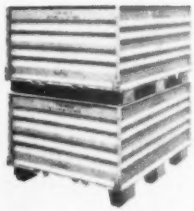
By combining abrasive grain with rolled steel, nonskid plate provides safe flooring for loading platforms and ramps, walkways, building entrances, and for trench and hatch covers. It is called Algrip, and its maker says you don't slip on it even when it is placed on a steep incline.

As the surface wears, new abrasive particles are constantly exposed, maintaining its nonslip characteristic. The plate can be sheared, drilled, countersunk, machined, and flame-cut. It is not suitable for flanging because of the nonelastic qualities of the abrasive material, but will permit some forming. The plates are available in thicknesses from $\frac{1}{8}$ to $\frac{3}{8}$ inch, in widths up to 60 inches; 144 inches long.

Alan Wood Steel Co., Dept. W-38, Conshohocken, Pa.







COLLAPSIBLE PALLET BOXES are strong enough to carry heavy castings, forgings, or stampings, yet fold flat for storage. Hinged sides lock together in the corners to hold firmly. The welded legs permit tiering, and are positioned for either crosswise or longitudinal loading in trucks or boxcars, or for storage.

Space-Saving Metal Pallet Boxes Fold Flat for Storage

These pallet boxes, called Return-O-Tainers, are made with hinged sides that lock together for use, fold flat for return or for storage. The sides, ends, and bottom are of welded corrugated steel, with reinforced legs. The openings in the base are designed to make possible either crosswise or lengthwise loading.

They measure 40x48x24 inches, and are strong enough to carry heavy semi-processed or finished parts, castings, forgings, or stampings. They can also be used for transportation of bulk products.

Boxes are also made with sides of expanded metal, correctly meshed to prevent the projecting of small parts. These have smooth steel bottom plates and strong metal bases. They also fold flat for storage or economical shipping.

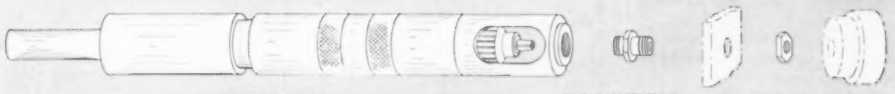
Fab-Weld Corp., Pickwick & Richmond Sts., Philadelphia 34.

Continued on page 136

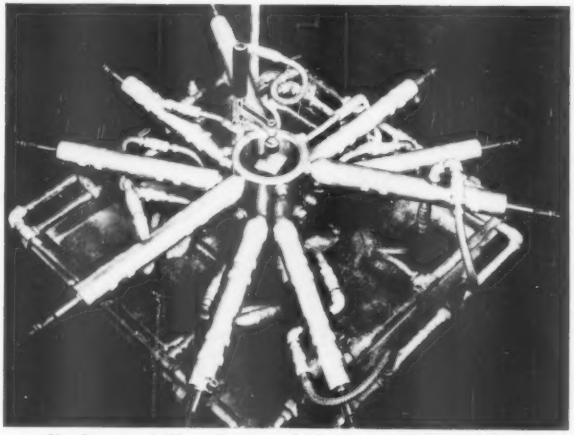
KELLER AIRFEEDRILLS

PRODUCTION DRILLING

with units that can be carried to the job



THE AIRFEEDRILL | DRILL BUSHING ADAPTER | FIXTURE | LOCK NUT | WORK



Simultaneous drilling of nine smoke holes in aircraft engine piston. Fixture designed for relocation of Airfeedrills to handle other similar jobs.

Expensive Jigs or Fixtures Are Not Needed

The Airfeedrill combines the efficient Keller air drill, an air cylinder, hydraulic dashpot, feed control, and stroke adjustment. These units are assembled into a rigid housing that can be "hung by the nose" from an inexpensive jig or fixture in any position or plane.

Available in five standard sizes. Drill to ¾" diameter steel; 1" in aluminum, brass, plastics.

Built as self-contained units, Airfeedrills are arranged for quick locking in jig bushings for progressively drilling a series of holes . . . useful where the workpiece is too cumbersome to bring to the drilling unit.

Airfeedrills are also adaptable to multiple drilling setups, where the units are permanently mounted in a fixture, for simultaneously drilling as many holes as desired . . . useful where small workpiece can be handily jig loaded.

4 GREAT ADVANTAGES

1. **Easy and economical to set up initially.**
2. **Fixture setups need not be permanent.**
3. **Can often be used in existing fixtures by simply mounting the Airfeedrills in bushing holes in fixture.**
4. **Fast and accurate control of stationary drills when equipped with Keller Four-Way Air Valves.**

K KELLER TOOLS

KELLER

Pneumatic Tools

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

THOMAS
Flexible ALL METAL COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

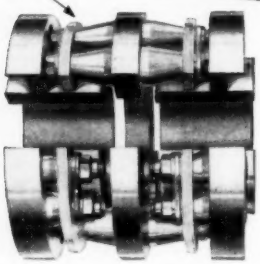
Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years

BACKLASH FRICTION WEAR and CROSS-PULL are eliminated
Lubrication is not required!

PATENTED FLEXIBLE DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

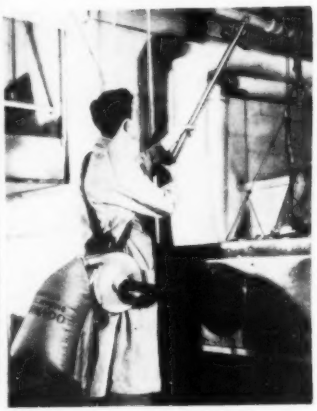
THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Accessories for Stockroom Shelves

This line of shelving accessories was designed to make things easier for the stockroom attendant. It includes pipe brackets to attach to the shelves for use with climbing rails, bumper posts and plates to protect the corners of the racks from abuse by passing hand trucks, and sway braces to give support and rigidity to skeleton-type racks. There are also boxes for small parts which fit on sloping shelves, and snap-on label holders for marking shelves and parts boxes.

The pipe brackets are made of 3/16 x⅞-in. bar, and will take standard ½-in. pipe. They can also be used to make a pipe handle for shelving trucks. The snap-on holders, for 1-3/16x3½-in. labels, lock in place on the edge of the shelf, but may be moved at will.

The General Fireproofing Co., Youngstown 1, O.



Portable Vacuum Cleaner

This looks like a bagpipe, but it's really a vacuum cleaner. You can sling it over your shoulder to leave both hands free. Its maker claims that it is particularly useful for cleaning stock bins and storage shelves, under machinery and work benches. It has a long reach, too, for overhead pipes, stairways, or hard-to-get-at places.

It is made in four sizes, with weights ranging from 7 to 16 pounds. Attachments are available for spraying and painting, and a device called Skaptrap salvages screws, nails, or other small metal parts, and keeps them from entering the fan chamber.

Breuer Electric Mfg. Co., 5100 Ravenswood Ave., Chicago 40.

Remote-Controlled Relay

Self-contained utility unit is intended for remote control of small motors, heating and lighting equipment, prowler projection lights, and other outdoor lights. Its housing is made of die-cast aluminum, with a snap-on weatherproof cover. The low-voltage wiring is contained in the upper compartment, the 125-volt connections in the lower. A screened drain in the bottom provides for condensation.

The relay has a capacity of 1/3-hp., 15-amp., 125-volts a.c.; or 5-amp., 250-volt d.c.

General Electric Co., Construction Materials Dept., Bridgeport 2, Conn.

Continued on page 138

NOW...in midget size

Sectional view showing bus in position
Feedin Box 2 or 3 pole
Plugin Outlets spaced on 20-inch centers
Hanger
Plugin Device 2 or 3 pole
End Closure

the NEW FA POWER PLUGIN

Designed for

50 AMP., 240 VOLT MAXIMUM FEEDER CAPACITY, AND ½ to 3 HP MOTORS

(7½ HP MAXIMUM WITH DUAL-ELEMENT FUSES)

THE COMPACT *MIDGET SIZE* PLUGIN (FA) BUSDUCT

The PLUG-IN convenience, flexibility and efficiency of Plugin (FA) Busduct is now available in *midget* size . . . 50 Amp., feeder capacity . . . for equipment requiring connections for ½ to 3 HP motors, 240 volts or less AC or DC . . . 7½ HP maximum, with dual element fuses.

(FA) POWER PLUGIN provides convenient plugin outlets all along the line. Approved by Underwriters' Laboratories, the duct is made in 5-foot and 10-foot sections with plugin outlets every 20 inches . . . additional outlets on special order. Special lengths are available for application on production benches and machines.

Midget PLUGIN UNITS, fitted with standard 30 Amp. capacity fuse connections, serve as excellent disconnect devices for the power feeder to the motor . . . permitting production machines to be moved in or out of the production line without slowing down or delaying plant production.

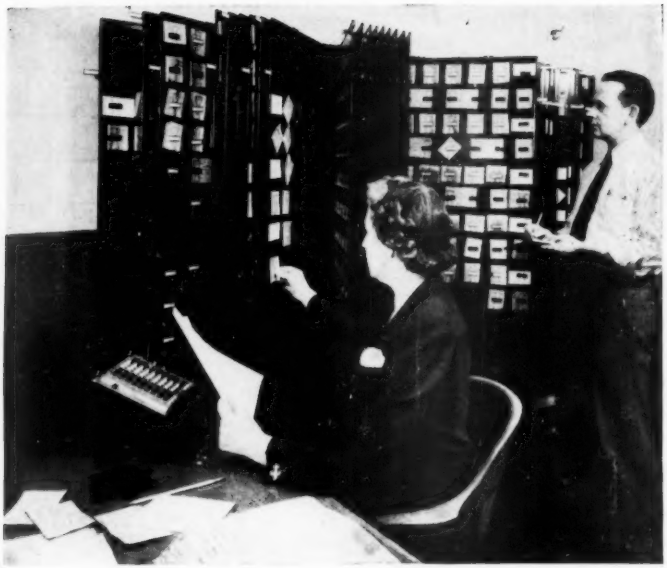
(FA) POWER PLUGIN's midget size (3 inches wide by 2 inches deep) provides a new flexibility in power distribution for even greater production efficiency.

You'll find much more information in our new Bulletin No. 703. We will gladly send it to you.

Frank Adam Electric Co.

ST. LOUIS 13, MISSOURI

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER



21 YEARS AGO, Universal Products Co., Dearborn, Mich. installed McCaskey Control for their production of many varieties and sizes of universal joints and drive shafts, securing . . .

FAST and EFFECTIVE CONTROL of PRODUCTION, COSTS AND TOOLS

Duplicate time tickets and other forms provide data for complete control at one-writing. Repeated postings of the same information have been eliminated. One copy is quickly filed on Planning Boards above, providing a visible record of progress and work-in-process by operations.

The other copy furnishes identical data for cost records. Both are immediately available at the end of operations or shifts.

McCaskey Tool Control has cut the loss of tools, time, tool breakage, and excessive inventories. McCaskey systems have brought numerous real savings.

Write for a demonstration or for descriptive folders. No obligation, of course.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me folders describing McCaskey Production, Cost and Tool Controls.

Name .....

Position .....

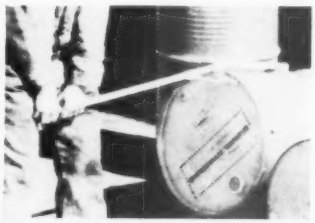
Company .....

Address .....

F1219

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

(Continued from page 136)



Drum-Upending Tool

Drum and barrel handling tool, called E-Z Up, has a tension clincher, no moving parts to slip or break. V-shaped strap-iron saddles are located at the point of leverage and the point of lifting. The leverage saddle at the end of the tool laps over the top expanded rolling hoop, while the lifting saddle hugs the drumhead at two points under the rim which supports the lifting weight. As leverage is applied, pressure forces the saddles to spread and grip the drum surfaces.

The tool is 42 inches long, weighs 6 pounds, and is made of all-welded 1-in. heavy-wall tubing.

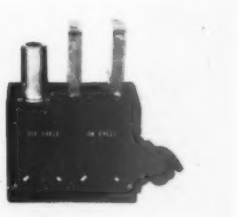
The D. S. Campbell Co., 6110 Euclid Ave., Cleveland 3.

Protective Enamel Coatings

Chlo-Dur enamels, it is claimed, will resist moisture, weather, alkalis and other chemicals, gases, and fumes. They are said to have good adhesion to concrete, wood, or metal surfaces, both above and under water. They don't scale, flake, or blister, according to the maker.

They are made from natural rubber reacted with chlorine, and you can get them in aqua, pale green, light blue, or aluminum. Although the colors are delicate, the maker says they will withstand repeated scrubbings without fading.

Brooklyn Varnish Mfg. Co., Inc., 50 Jay St., Brooklyn 1, N. Y.



Electronic Timer

You can operate the Cyclo-Flex timer either single interval with manual initiation, or as a repeat cycle timer with two adjustable intervals which occur successively without external operation. Each interval is accompanied by relay con-

CUTS WEIGHT UP TO 50%

INCREASES BURSTING STRENGTH

EXTRA DURABILITY

GREATER FLEXIBILITY

Sinewed for savings with Du Pont "Cordura" yarn

From the varied types of high pressure hose used by industry right on down to the consumer's garden hose, the strength of Du Pont Cordura* High Tenacity Rayon offers many advantages.

"Cordura" just about doubles the bursting strength of air hose . . . makes it stand up against rough service . . . resist flexing, strain, and internal friction.

"Cordura"-reinforced garden hose weighs much less . . . coils smoothly . . . is more flexible.

"Cordura" also improves the quality of conveyor belts, V-belts, tires and many other products. That's because "Cordura" is engineered to yield much greater strength than yarns made of natural fibers. And each strand of this yarn is a *continuous* filament —has no short pieces to pull apart under a strain.

Because you get so *much* strength from so *little*, "Cordura" makes possible lighter, stronger products, plus important cost-wise advantages.

*REG. U. S. PAT. OFF.

Can "Cordura" improve your product?

Inherently stronger than natural fibers commonly used, and usually more economical, "Cordura" is a yarn you can't afford to overlook. Perhaps the uses described above suggest still another application to you. Write us about it . . . and tell us if you need data on the performance of this yarn under unusual operating conditions. We'll be glad to give you a detailed analysis of the application you have in mind, along with other helpful information. Write Rayon Div., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

DU PONT "CORDURA" HIGH TENACITY RAYON

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

for RAYON . . . for NYLON . . . for FIBERS to come . . . look to DU PONT

Like Any Good Precision Tool

KEX INDUSTRIAL WIPING TOWELS

are made for a specific job...

and that job is Wiping!

This is why KEX INDUSTRIAL TOWELS are uniformly:

1. Soft . . . woven from thirsty cotton with no harsh surfaces to mar delicate machinery or finished products.
2. Bound at the edges, so that there are no loose or ragged ends to get caught in moving machinery.
3. Made a convenient, uniform size so that every square inch is usable.
4. Super-absorbent and scientifically cleansed to reduce possible infection.
5. *Actually precision items,* produced precisely for one purpose only—*your important wiping jobs.*

Rent KEX wiping towels and figure your profits!

There's nothing to buy, no expensive inventory—just a low monthly rental. KEX TOWELS are delivered in neat, easily stored bundles, regularly in quantities as desired. This helps you control distribution.

For complete information see your classified telephone directory for nearest KEX Distributor, or write KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE
REG. U.S. PAT. OFF.

tact closure, obtained by the charging of a resistance-capacitance network.

Variations in line voltage, temperature, or humidity affect the timer intervals very little, according to the maker. To convert from single interval to repeat cycle operation, you merely rotate the off-cycle control clockwise to the interval you want. It then operates as a repeat cycle timer. To convert it back to single interval with manual initiation, rotate the off-cycle control back to zero. You may connect a foot switch or other contactor if more convenient.

The timer may also be used in refluxing, electroplating, life-testing, heat-sealing, valve-pacing, bottle-filling and temperature control.

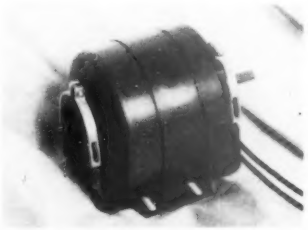
G. C. Wilson & Co., 2 N. Passaic Ave., Chatham, N. J.

Four-Way Valve

Designated Model 1044, 4-way, pilot-operated, solenoid-controlled valve handles air, water, and light oils. It may be operated continuously at any cycling speed up to 600 cycles per minute. It is made in two types: for operation on line pressures from 0-50 psi., or for line pressures from 30-150 psi.

Bodies are cast bronze, full ported, with screwed pipe connections tapped $\frac{1}{4}$-, $\frac{3}{8}$-, $\frac{1}{2}$-, or $\frac{3}{4}$-in. I.P.S. Internal parts, including the main valve members, are brass; pilot plunger and ball valve are of stainless steel.

Crescent Valve Co., 6073 State St., Huntington Park, Calif.



Unit-Bearing Motors

Line of lifetime lubricated, shaded-pole motors is made in frame sizes 11 and 21. You can operate them in any position—shaft up, down, horizontal, or at any intermediate angle.

Designated Type KSP, they can be

Everyone's talking about . . . . . the New Protectoglo

HERE are seven important reasons why the New Protectoglo is the hottest news in Flame Safety.

- Positive Flame Failure Protection through the "rectification principle" which alone provides positive fail-safe operation . . . does not rely on flame conductivity.
- Expensive shielded cable not required.
- Automatic Self-Checking Circuit safeguards start-up and entire operation.
- Can be used with any type of fuel.
- Plug-In Timer permits addition of purge timing in field.
- Relite is possible without additional relays.
- Built-To-Take-It unit construction.

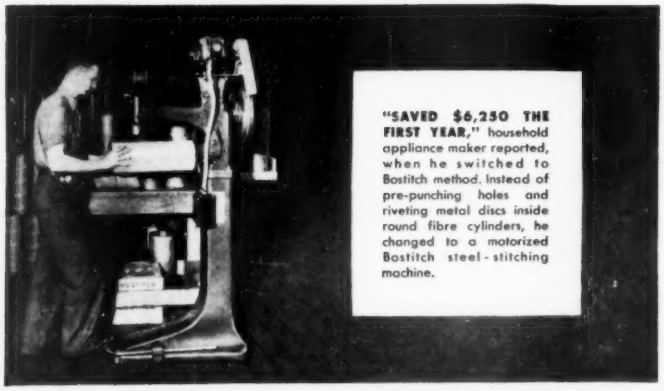
Your local Honeywell engineer has all the detailed facts and figures. Call him in . . . today . . . he is as near as your phone!

The Protectoglo is a modern combustion safeguard which provides positive protection in event of flame failure in gas or oil fired equipment . . . such as furnaces, ovens, etc.

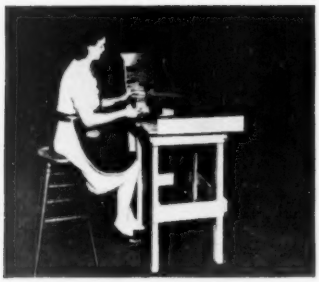
MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4461 Wayne Ave., Philadelphia 44, Pa.
Offices in 73 principal cities of the United States, Canada and throughout the world

BROWN INSTRUMENTS — WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL — BELFIELD VALVES

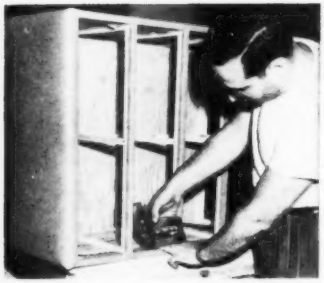
MINNEAPOLIS Honeywell — *Advanced Instrumentation* FOR METAL PROCESSING — BROWN INSTRUMENTS



"SAVED $6,250 THE FIRST YEAR," household appliance maker reported, when he switched to Bostitch method. Instead of pre-punching holes and riveting metal discs inside round fibre cylinders, he changed to a motorized Bostitch steel-stitching machine.



PRODUCTION DOUBLED for brush manufacturer when Bostitch foot-operated stapler replaced machine-nailing for fastening metal ferrules to wooden handles. Production up from 425 dozen a day to about 900 dozen.



50% SAVINGS IN TIME AND LABOR for furniture firm when Bostitch T5 automatic tackers replaced magnetic hammers and tacks for applying leatherette to wooden bedsteads and matching chests.

Which of the

800 BOSTITCH MACHINES WILL CUT YOUR FASTENING COSTS MOST?

The Bostitch fastening method includes more than 800 different machines for stapling, tacking and wire-stitching. One or more of them may be just what you need to fasten your product better and faster with wire. Why not investigate?

Fill in and mail the coupon below . . . today.

Attach this coupon to your letterhead

BOSTITCH, 406 Mechanic Street, Westerly, R. I.

My problem involves fastening ..... to ..... now use .....

Please send me literature describing the Bostitch machines you believe will help me cut my fastening costs.

Name.....Title.....

Firm.....

Street.....

City.....Zone....State.....

BOSTITCH

fastens it better, AND FASTER, with wire

ALL TYPES OF MACHINES FOR APPLYING STAPLES

ALL TYPES OF STAPLES APPLIED BY MACHINES

Trade-Mark "Bostitch" Registered U. S. Patent Office and Foreign Countries

used as drives for exhaust fans, cooling fans, evaporative coolers, unit heaters, condenser cooling, or space heaters. You can also use them on small pumps, agitators, and blowers.

They are made in both open or totally enclosed models. Ratings range from 25 millihorsepower (1/40 hp.) through 1/12 hp. at 115 or 230 volts, 1050 or 1550 rpm., 60 cycles. Mounting arrangements include resilient end-ring mounting, resilient cradle base, and band mounting, or with four tapped holes for end mounting.

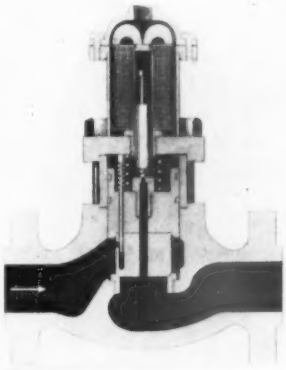
Fractional-Horsepower Motor Divs., General Electric Co., Schenectady 5, N. Y.

Resistance Tester

Model 151-S microhm meter is a 5-range instrument for use in checking low resistance valves in circuit breaker contacts, cable joints, busbar connections, limiters, windings, and material tests. Microhm ranges are 0-75, 0-750, 0-7500, 0-75,000, and 0-750,000 microhms.

The instrument is powered by self-contained standard dry cells. An internal shield protects against stray field effects. The instrument case measures 8x10x6 inches, weighs 18 pounds, has protected corners and a removable cover.

J. W. Dice Co., Englewood, N. J.



Electro-Hydraulic Solenoid Valve

This solenoid-operated valve has a forged-steel body with the disk and seat made of wear-resistant Exelloy. You can use it for oil or oil-vapor service on temperatures up to 1000

degrees F., and for steam, water, air, gas, and in general service on temperatures up to 850 degrees.

The valve is packless, and has only three moving parts. It operates from a 6-volt storage battery, and is made in sizes from ½ to 2 inches.

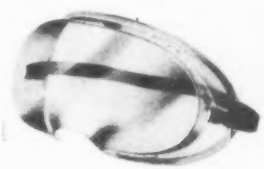
It is also made in corrosion-resistant metals in sizes from ¼ to 3 inches, and for high-pressure corrosion-resistant service, 1 to 10 inches.

Hoppe Engineering Co., Greensboro, Indiana.

Leveling Ladder Attachment

Interconnected hydraulic units in this ladder attachment automatically compensate for uneven ground conditions. By moving a foot-operated valve lever, you can lock the ladder legs in any position. You can attach it to any type of ladder — wood or metal, straight or flared base. Telescopic steel tubing automatically adjusts to the proper width, and the unit can be reused on ladders of different dimensions.

The Anderson Products Co., Tulare, Calif.

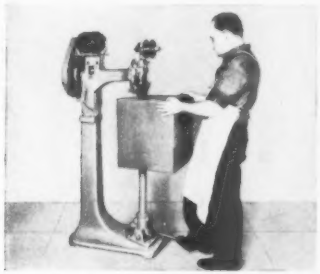


Safety Goggle

Plastic safety goggle, called Coverlite, weighs less than one ounce. Its frame is injection molded, and gives full protection against impact, dust, flying sparks, and chips. The maker says that ample air space and ventilation prevents fogging, while the large frontal area provides a wide range of vision in all directions.

It is made with frames of clear, light green, or dark transparent

"SIX TIMES FASTER THAN OUR PREVIOUS METHOD," reports a prominent nurseryman of California. They now use Bostitch H2 Stapling Hammers instead of hammer and nails to fasten burlap and heavy paper to wooden crates. Crates are 6 feet tall and weigh from 70 to 450 lbs.



PAYS FOR ITSELF IN A FEW MONTHS is the unanimous opinion of big shippers who use this Bostitch Bliss Bottom Stitcher. No more carton-shaping bottlenecks! This high-speed machine seals bottom flaps of corrugated containers faster than any other method.

SEALS ON THE INSIDE ENTIRELY FROM THE OUTSIDE. That's why Bostitch Autoclench machines are standard for top-sealing in many shipping rooms. Self-clinching staples (no sealing blade to insert) discourage pilferage . . . make quick, secure seal.

PROFITS ARE MADE IN SHIPPING ROOMS — THROUGH SAVINGS

Bostitch "job-engineered" fastening equipment cuts shipping room costs, eliminates bottlenecks, and protects against pilferage and damage in transit. More than 800 Bostitch stapling machines, wire stitchers, self-feeding hammers and tackers promise you a specific cost-cutting solution to almost any shipping room or other fastening problem. It will pay you to investigate. Mail the coupon below — today.

ATTACH THIS COUPON TO YOUR LETTERHEAD

BOSTITCH, 404 Mechanic Street, Westerly, Rhode Island

Please send me:

- ☐ Bulletin Ptg. 105 on Bostitch Self-feeding Hammers.
- ☐ Bulletin Ptg. 218 about Bostitch Autoclench for top-sealing.
- ☐ Bulletin Ptg. 229 on Bostitch Box Bottom Stitchers.

Name ..... Title .....

Firm .....

Address .....

City ..... Zone ..... State .....

BOSTITCH

fastens it better AND FASTER with wire

ALL TYPES OF MACHINES FOR APPLYING STAPLES

ALL TYPES OF STAPLES APPLIED BY MACHINES

Trade-Mark "Bostitch" Registered U.S. Patent Office and Foreign Countries

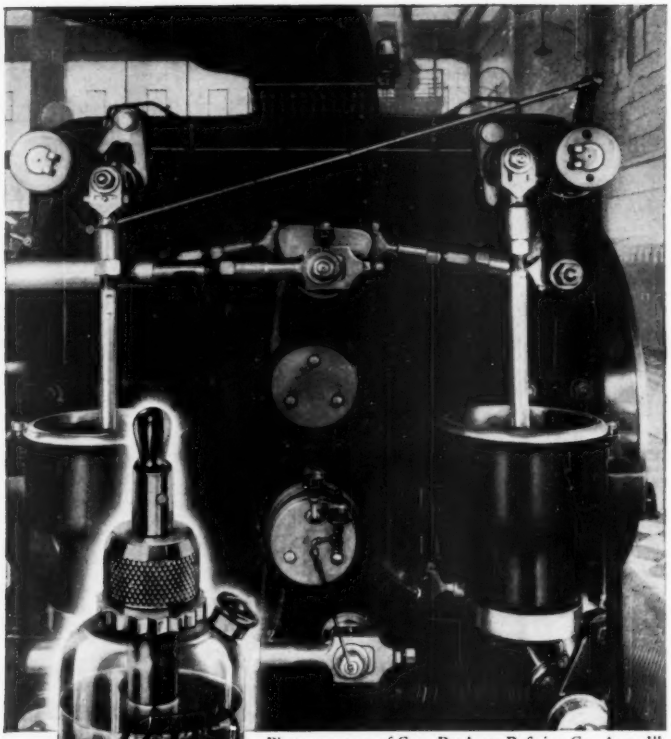
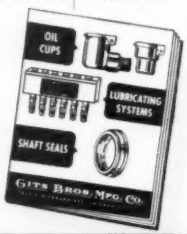


Photo courtesy of Corn Products Refining Co., Argo, Ill.

"WE CAN DEPEND ON GITS OILERS"

That's the experience of Corn Products Refining Co. and many other leaders of industry. It's vital for these companies to avoid costly machine down-time. They know that: (1) Burned-out bearings due to faulty lubrication are a major cause of down-time. (2) Gits oilers eliminate faulty lubrication. (3) Gits oilers help achieve the important benefits of uninterrupted machine performance: maximum production . . . no wasted lubricant . . . less power consumption. That's why, for the past 40 years, industry has looked to Gits oilers and and lubricating systems . . . for *dependable, proper* lubrication, with very low costs of installation and maintenance.

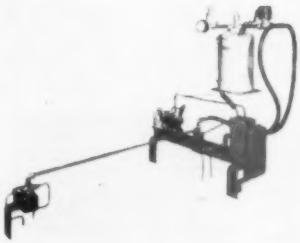
FREE LUBRICATION ENGINEERING SERVICE by Gits Engineering Staff, backed by 40 years of experience. Submit your problem—receive prompt recommendations. No obligation. **WRITE TODAY FOR THIS FREE BOOKLET** describing in detail the full Gits line of the most modern oilers and lubricating systems.



GITS BROS. MFG. COMPANY
1831 South Kilbourn Avenue • Chicago 23, Illinois

plastic that can be worn comfortably over most types of personal glasses. The elastic headband is adjustable.

Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12.



Slat-Conveyor Lubricator

This automatic oil lubricator is intended for use on slow-moving slat conveyors that require positive timing. In operation, a tripping mechanism actuates a microswitch which in turn energizes a timer controlling the operation of a straight-away solenoid valve. The valve opens when the tripping mechanism is actuated by the wheels on the outside of the slat conveyor, and remains open until closed by the timer. Timer setting allows a predetermined measured amount of lubricant to be injected into the wheel bearings.

The J. N. Fauver Co., Inc., 49 W. Hancock, Detroit 1.

Portable Conveyor

The Handy-Handler general-purpose portable conveyor was designed to carry coal, salt, gravel, sand, or similar bulk materials. It is made of aluminum alloy, and can be carried and positioned by one man.

Several models are available, the lightest of which weighs 119 pounds and is equipped with a 2-hp. gasoline engine. Lengths range 10 to 20 feet. The standard 16-ft. model may be increased to 20 feet by inserting a 4-ft. midsection.

There is a choice of three electric motors or three gasoline engines, and you may select either rubber flights and continuous rubber belt or steel flights and chain, depending on the application intended.

The Belt Corp., Orient, O.

D.C. Motors

Type SK d.c. Life-Line motors are made in 1- to 30-hp. ratings. They are of all-steel construction, and have prelubricated sealed-for-life ball bearings. You can get them in frames 203 to 365, for constant, adjustable,

What makes the difference in Unit Heaters?

DISCHARGE AIR TEMPERATURE*

Mibs shooter or stilt walker — you're comfortable either way if Modine Unit Heaters supply the heat. Modine's *right* combination of correct outlet temperature and sufficient air velocity heats all parts of a room uniformly, even in coldest weather.

You'll find just the unit heater you need from Modine's complete line of 3 types and 47 capacities.

**For maximum comfort and lowest operating cost, temperature of air leaving unit heater should be between 110°-120°F. at standard conditions.*

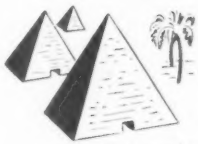
LOWER COSTS

Fuel bills drop when you heat with Modine Unit Heaters. Modine's sufficient air velocity and correctly related outlet temperatures combine to deliver heat down into comfort zones where it's needed . . . don't waste it on ceilings or above heads of room occupants.

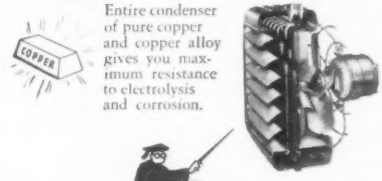
Built-in velocity generator increases heat throw *without increasing power costs* . . . lets large share of warm outlet air disperse cold air near floor.

Modine gives you lower power and motor maintenance costs, too, by using only high-quality, totally enclosed split-phase or capacitor motors on all but smallest unit heater models.

LONGER LIFE



Modine Unit Heaters last longer. One exclusive feature, Parker-Bonderizing, protects casings and sheet metal parts against formation and spread of rust . . . anchors paint to steel . . . prolongs original attractive finish.



Entire condenser of pure copper and copper alloy gives you maximum resistance to electrolysis and corrosion.

Controlled brazing results in one-piece, integrated coil construction, eliminating all weak spots. What's more, Modines have no screwed or expanded joints, no gaskets or bolts.

Modine
UNIT HEATERS

Yes . . . look beyond BTUs when buying Unit Heaters. Look to Modine! You can get all the facts by calling your nearest Modine Representative. He's listed in the classified section of your phone book. Or write direct. Modine Mfg. Co., 1505 Dekoven Ave., Racine, Wisconsin.

Ask for the new Modine Unit Heater Bulletin 149-A. Also available on special request is the informative booklet — "Here's How to Evaluate Operating Characteristics of Suspended Unit Heaters." Send for them today!

U-1043

QUICK HEAT

WHERE YOU WANT IT

WHEN YOU WANT IT

..at the flick of a switch!

Just flick the switch for efficient space or spot heating available (with either of the portable units) 5 minutes after the unit is delivered. No flue needed—completely SAFE—no carbon monoxide or unburned hydrocarbons.

new SILENT GLOW HEATERS PORTABLE

A complete line of 8 Industrial Heaters, delivery from 170,000 to 800,000 B.T.U. per hr. — low original cost — low operation cost—using No. 3 oil — manual or fully automatic operation — rigid, light weight construction—portable — ignite electrically at the flick of a switch — no matches or open torch.

Typical Uses

FOR HEATING IN WAREHOUSES • GARAGES FOUNDRIES • HANGARS NEW CONSTRUCTION • PLASTER CONCRETE • FROZEN PIPES OR GROUND PRE-HEATING FREIGHT CARS • MACHINERY EMERGENCY HEATING, ETC.

MAIL THIS COUPON TODAY

Save the Cost of Coal SILENT GLOW OIL BURNING

THE SILENT GLOW OIL BURNER CORP.
863 Windsor Street
HARTFORD 5, CONNECTICUT

Name _____

Firm _____

Street _____

City _____ State _____

ISH 49

or varying speed applications, for either continuous or intermittent service. Depending upon the use intended, they can be supplied with shunt, compound, or series windings, and operate from 115, 230, 550, or 660 volts.

Westinghouse Electric Corp., Box 868, Pittsburgh 30.

Spotlight Lamp

Narrow-beam projector 200-watt spotlight lamp is designed for both indoor and outdoor use. It was developed to meet the need for a compact spot lamp with a long throw.

It is sealed-beam type, with a bulb of pressed heat-resistant glass. It has a side-prong base. Initial maximum beam candlepower is about 50,000.

Lamp Dept., General Electric Co., Nela Park, Cleveland 12.

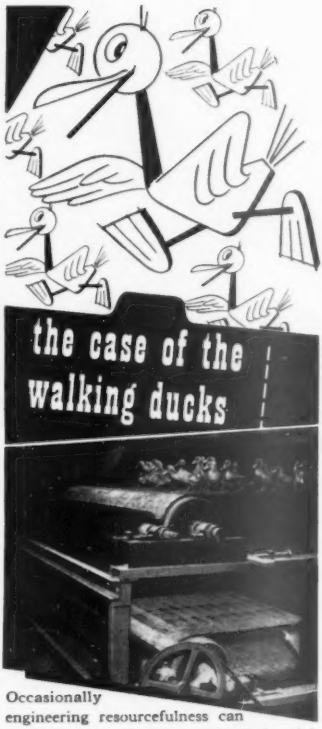
Removable Safety Treads for Shoes

Tigerfoot safety treads slip right on over your shoes or boots. They are sandal-like, with soles of tough Behr-Manning Foothold fabric. Maker says they are comfortable to wear, and useful wherever slippery going is a hazard—on greasy, wet, or icy floors, ramps, scaffolds, or docks.

The New Products Development Corp., 2080 Grand Blvd., Schenectady, N. Y.

Magnetic Grounding Clamp

The MagnaGround is a permanent Alnico magnet made to serve as a clamp for the ground cable of electric welders. It takes up to 600 amperes.



Occasionally engineering resourcefulness can spotlight an otherwise plain industrial product with a new and unusual use . . . such as the case of this Woven Wire Conveyor Belt installation in a duck brooder.

Newly hatched ducklings, it seems, have to be kept moving to be kept alive. Placed on this specially built woven wire belt moving at a slow rate of speed, the ducklings remain there for eight days . . . continually treadmilling away from the falling end of the belt. Mortality rate dropped to zero. By-product recovery . . . duck droppings for fertilizer . . . is aided by the open mesh of the woven wire belt.

Even if you don't operate a duck hatchery, call in a Cambridge engineer whenever you have a problem concerning the movement of materials or products during processing. Let him explain the superior construction features of **CAMBRIDGE Woven Wire Conveyor Belts.**

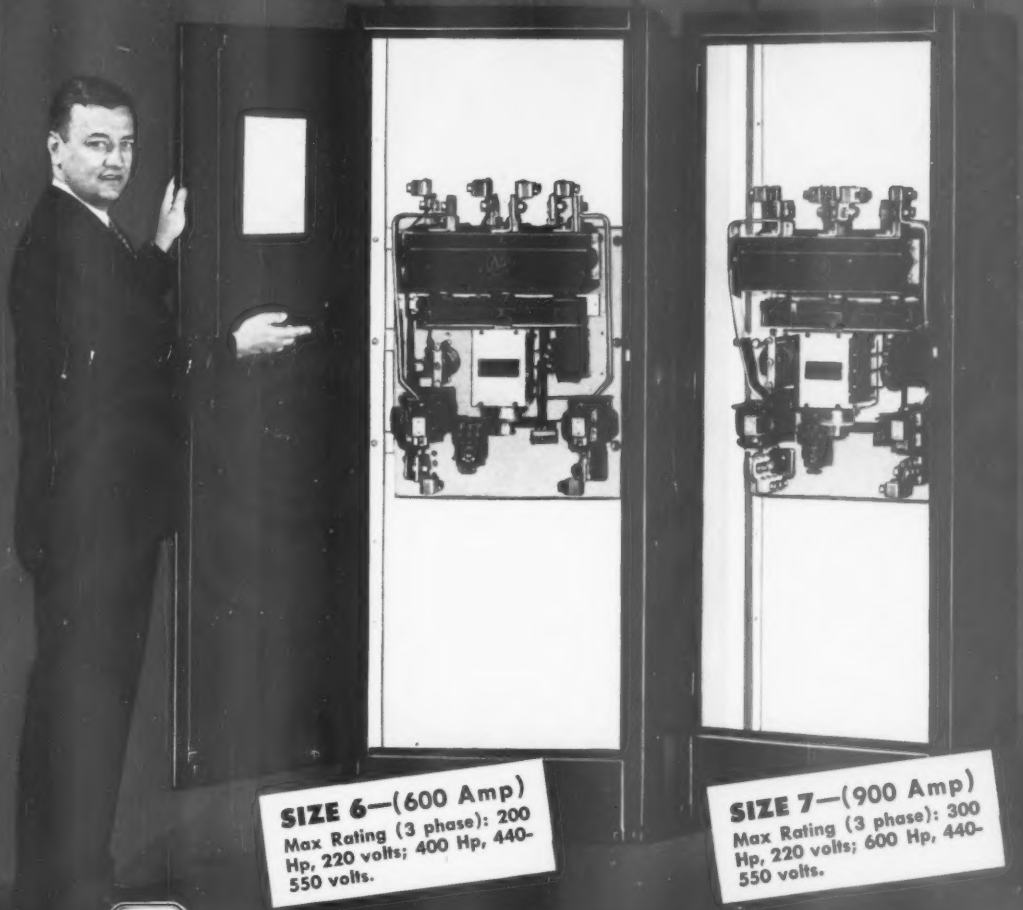
This illustrated 130 page catalog--FREE--to men concerned with production control. WRITE TODAY.

Cambridge
WIRE CLOTH CO.
Department E • Cambridge 12, Md.

BOSTON • NEW YORK • BALTIMORE
PITTSBURGH • DETROIT • ST. LOUIS
CHICAGO • SAN FRANCISCO • HOUSTON

Announcing...

The *NEW* Size 6 and Size 7 SOLENOID Starters



SIZE 6—(600 Amp)
Max Rating (3 phase): 200 Hp, 220 volts; 400 Hp, 440-550 volts.

SIZE 7—(900 Amp)
Max Rating (3 phase): 300 Hp, 220 volts; 600 Hp, 440-550 volts.

A-B Quality

ALLEN-BRADLEY

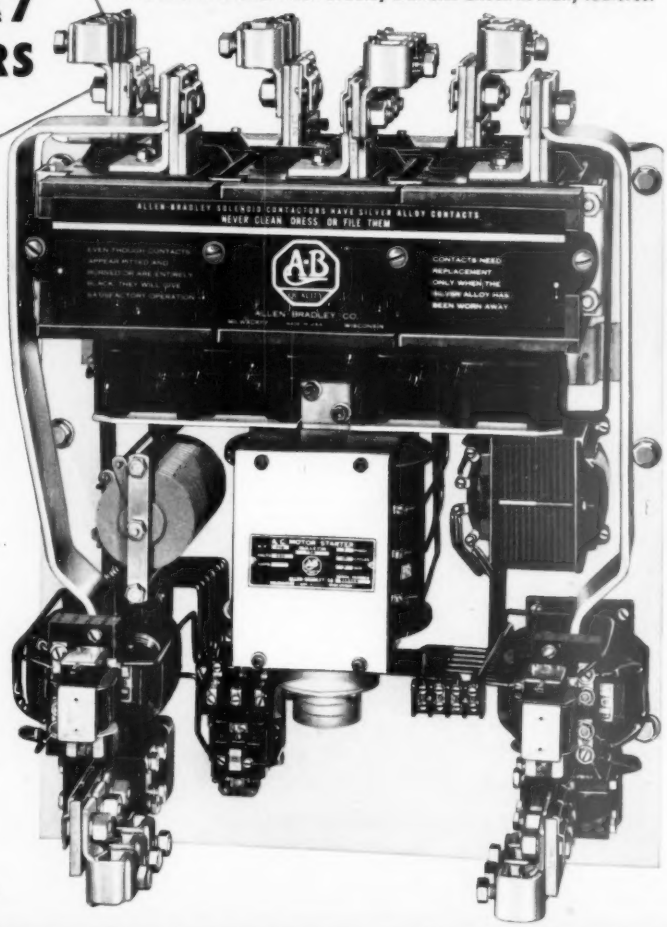
SOLENOID MOTOR CONTROL

SEE OTHER SIDE

Now- All the Advantages of SOLENOID design

in the NEW SIZES 6 & 7 STARTERS

In years of service, under all operating conditions, the Allen-Bradley solenoid construction has proved its superiority beyond all question of doubt. Now Allen-Bradley has developed Sizes 6 and 7 solenoid starters . . . with all the features that have proved so successful in smaller Allen-Bradley starters. Check its many features.


ALLEN-BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN, DRESS, OR FILE THEM
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY
A-B
ALLEN-BRADLEY CO.

SILVER ALLOY CONTACTS

The double break, silver alloy contacts never require cleaning or filing—a distinct advantage over conventional copper-to-copper contacts.

SIMPLE, RUGGED CONSTRUCTION

These starters have no pins, pivots, hinges, or complicated mechanisms to cause trouble. The solenoid switch mechanism has only one moving part.

SMALLER SIZE

The open type Size 6 starter is less than ¼ as large as conventional starters, and the enclosed unit takes only 58% of the floor space. Size 7 is even smaller, compared with other starters.

STEEL PANEL MOUNTING

The switch is mounted on a metal base plate instead of a slate panel, and is self insulated. It can be quickly and easily mounted to metal surfaces without additional insulation.

FRONT-OF-PANEL WIRING

All terminals and wiring are readily accessible from the front. There is no back panel wiring.

AVAILABLE IN MANY FORMS

Size 6 and Size 7 solenoid switches can be furnished in 2 pole or 3 pole contactors, across the line starters, reversing switches, reduced voltage starters, and many other combinations where clapper type switches were previously used.

Write for Information

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.

A-B Quality

ALLEN-BRADLEY

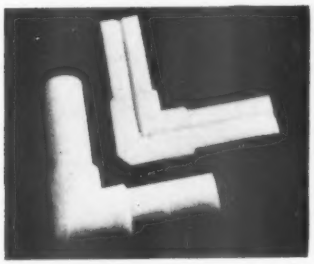
SOLENOID MOTOR CONTROL

QUALITY

You can attach it either with set screws or by silver soldering.

The clamp can be applied on any magnetic surface, vertical or horizontal, and the magnet will hold it fast, claims its maker. Can be used on nonmagnetic stainless steel. It is small and compact; can be used as a holding or welding fixture.

Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 14.



Cold-Pipe Insulation

K-Shield is a lightweight pipe and vessel insulation made of Styrofoam, an expanded plastic containing many tiny closed-wall cells. It was developed for use as cold-pipe insulation in processing plants, cold-storage units, and other special jobs.

It weighs about $1\frac{1}{4}$ to $1\frac{1}{2}$ lbs. per cubic foot, and you can cut and fit it with ordinary tools. The maker says that no vapor-seal coating is needed, as it is a rigid material which forms its own moisture barrier.

Robinson Industries, Coleman, Mich.

Parts Degreaser

This degreaser was designed to save time and labor, and to eliminate fire hazards. It can be used for cleaning all kinds of mechanical parts. The dirt and grease removed settles to the bottom of the tanks and may be flushed out through a drain plug.

Although it requires about 70 gallons of detergent, the maker says a single filling lasts for months, since the fluid is recirculated constantly. An immersion-type heating unit with thermostatic control is optional equipment. It is said that the detergent performs more efficiently when heated.

The unit has two tanks, one large,

Removing filings, sawdust and small scrap

AROUND MACHINES... IN THE PLANT...

Modern General Electric Heavy-Duty Cleaners quickly prove their value

From front office to boiler room, General Electric Heavy-Duty Vacuum Cleaners are doing unusual jobs as well as the usual cleaning jobs with new speed, new efficiency, new economy.

Let these powerful cleaners do these and other cleaning jobs for you:

- wet and dry pick-ups from floors
- cleaning large floor areas (12-in. and 18-in. nozzles save time)
- dusting polished surfaces without scratching
- vacuuming hazardous dirt and dust from high-up areas
- pick-up of heavy dirt and small pieces of metal scrap for salvage.

Wide nozzles speed floor cleaning

The speed and capacity of modern General Electric cleaning equipment will surprise you. It will enable your maintenance department to do more and better work. Send coupon for specification literature. A survey, made without cost or obligation, will tell you just what equipment you need.

Industrial Cleaners

GENERAL ELECTRIC

SEND TODAY!

Learn all about G-E Heavy-Duty Cleaners

GENERAL ELECTRIC CO., Dept. 22-1316
1285 Boston Ave., Bridgeport 2, Conn.

Our most serious cleaning problem is.....

.....

Without obligation, please send the story of your new equipment.

NAME.....

FIRM.....

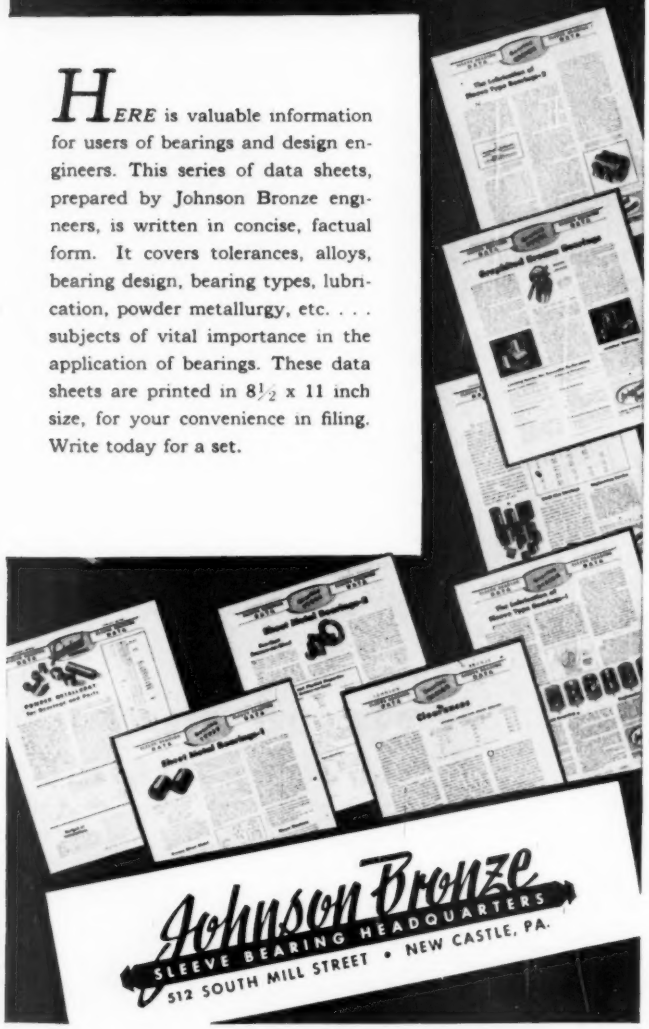
ADDRESS.....

CITY.....STATE.....

Free

facts about BEARINGS and bearing use for YOUR FILES

HERE is valuable information for users of bearings and design engineers. This series of data sheets, prepared by Johnson Bronze engineers, is written in concise, factual form. It covers tolerances, alloys, bearing design, bearing types, lubrication, powder metallurgy, etc. . . . subjects of vital importance in the application of bearings. These data sheets are printed in 8½ x 11 inch size, for your convenience in filing. Write today for a set.



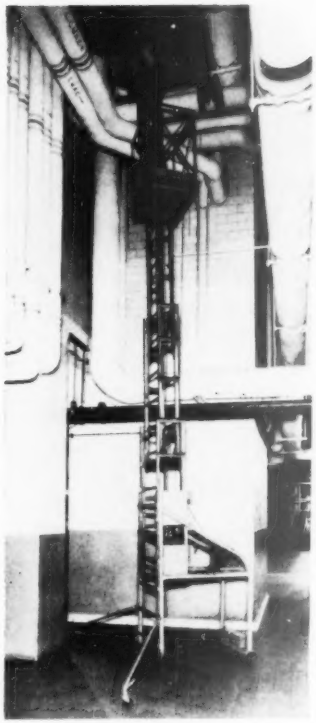
Johnson Bronze

SLEEVE BEARING HEADQUARTERS

512 SOUTH MILL STREET • NEW CASTLE, PA.

one small. A platform in the larger tank holds the parts while the detergent is being washed over the parts; if soaking is required, the parts may be lowered into the smaller tank. This has an expanded steel basket to hold small parts.

Wilkinson Mfg. Co., Dept. 40, Omaha Nat'l. Bank Bldg., Omaha 2, Neb.



Electrically Operated Extension Ladder

This 6-ft. ladder can be extended to a 30-ft. scaffold in less than 5 minutes, according to its maker. Called the Hi-Lift Extension Scaffold, it occupies a floor space of 29x54 inches, and will pass through a 30-in. door opening.

It is electrically operated, and rolls on four swivel casters. The platform top has a safety rail that can be stored away in a U-frame when not in use. The four sections to the ladder telescope into each other. If you want to raise it only part way, a heavy worm gear locks it in any position. The base is steady and non-tipping, and will straddle equipment and stock piles.

Atlas Industrial Corp., 849 39th St., Brooklyn 32, N. Y.

Protective Hand Cream

Glov-Cote is a hand cream that you put on before you get your hands dirty. It acts like a glove over the hands and arms, and its protective

64 pages packed with practical down-to-earth data showing actual examples of cost-saving production techniques.

45 *case studies...*

...crammed with facts showing HOW photoelectric and electronic controls solve problems and prevent bottlenecks in industry. Indexed both by industries (textile, paper, metal, etc.) and by application (counting, detecting, sorting, etc.), its factual data tears aside the hocus-pocus and makes electronic control an easy-to-understand aid to industry.

Acting with the speed and certainty of light, Photoswitch photoelectric and electronic controls count, guard, sort, record, detect, measure, weigh, maintain liquid levels, program operating cycles and do countless other tasks with unfailing accuracy and amazing speed.

No industry which has ever been surveyed has failed to show one or more applications which bring benefits to plant operation.

Clip the coupon or write us on your own letterhead for YOUR copy of the free booklet shown above.

PHOTOSWITCH
INCORPORATED
CAMBRIDGE, MASSACHUSETTS

PHOTOSWITCH, INCORPORATED
79 Broadway, Cambridge 42, Mass.

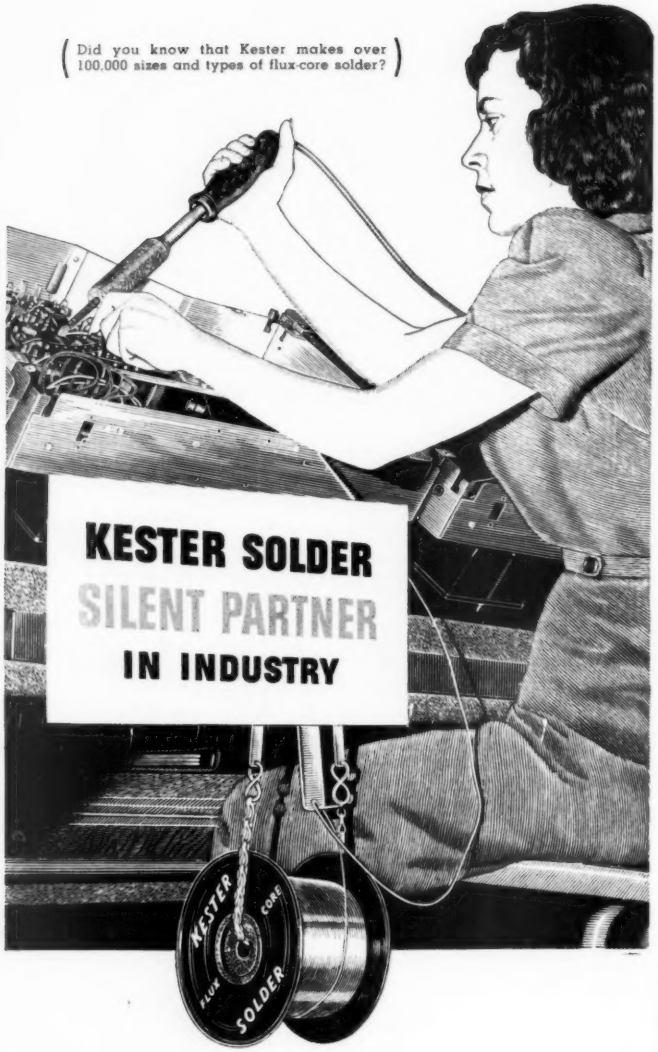
Please send my free copy of:
"Cutting Production Costs with Electronic Controls"

Name..... *Title*.....

Company.....

Street.....

City..... *Zone*..... *State*.....



For over fifty years Kester has been concerned with producing solder for every phase of industrial work. Take advantage of this experience by consulting Kester's Technical Department on all soldering problems. There is no obligation.

FREE—Technical Solder Manual Available on Request

Send for Kester's new solder manual, "SOLDER and Soldering Technique."

KESTER SOLDER COMPANY
4201 Wrightwood Avenue • Chicago 39, Illinois

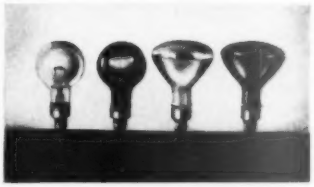
Factories also at
Newark, New Jersey • Brantford, Canada

1899 50th Anniversary 1949
KESTER SOLDER

film washes off easily, even with cold water. As it dissolves, it carries away with it any cutting oils, paint, grease, ink, or grime that may have collected on your hands during the day's work.

It has no wax filler to clog the pores. It is not claimed to have any curative powers, but the maker says that it does protect the skin from the irritations often causing dermatitis.

Chase Chemical Co., 2901 Dover Ave., Cleveland 9.



Infra-Red Lamps

Sealed-beam 500-watt heat lamp uses a tungsten filament, pretested for twist and sag, and is built with a protective supporting structure. The inside of the bulb is lined with pure polished silver that acts as a built-in reflector. Other models include sizes from 125 watts up.

Amplex Corp., 111 Water St., Brooklyn 1, N. Y.

Revolving Storage Units

These revolving bins make up complete storage units in themselves. They are made with seven shelves, four shelves, or as a counter-top unit. Each shelf has a continuous label holder. Up to five additional dividers can be added to separate each bin into smaller containers. Wide spacing on the two bottom shelves allows good visibility and easy access.

Lyon Metal Products, Inc., Aurora, Ill.

Pressure Horns

Line of powerful pressure horns blasts loud signals over large areas, claims their maker. They are made of heavy weather-resistance bronze in four types: 1-, 2-, 3-, or 4-way. Your choice of signal depends upon the area to be covered and noise and wind conditions.

The horns operate on air, steam, butane, propane, or any gaseous

Are YOU Wasting Money in Inventory?

WHEN production inventories are being closely watched, as now, are you tying up needless money in inventory for maintenance? Your Distributor carries a maintenance inventory for you. In his stock are all the many things needed to keep your production moving, including Bronze Bars and Bronze Bearings—Bunting Bronze Bars and Bearings.

You do not need to duplicate, in your plant, an inventory which your Bunting Distributor is already carrying as a normal, natural part of his function. Nor can you expect to rival the completeness of his Bunting Stock without needlessly tying up your capital.

Your Distributor is prepared to serve you and interested in doing so. The leading Distributor in your area is,—almost certainly,—the Bunting Distributor. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities. 89

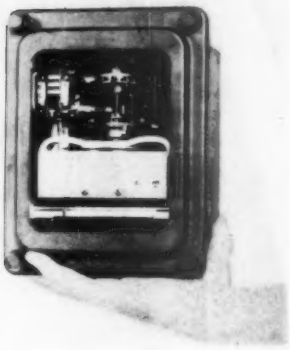
Bunting®

BRONZE BEARINGS · BUSHINGS · PRECISION BRONZE BARS

R. Osborn
"Johnson's been defeating all comers since he covered his log with slip-resistant 4-WAY Safety Plate."
You'll be a winner, too, with Inland 4-WAY Safety Plate in your plant or on your product . . . because 4-WAY cuts costly slips and falls. Its raised-lug pattern provides firm, *sure* footing. Made of steel, it won't burn, crack, warp, or splinter . . . and it's practically maintenance free. INLAND STEEL CO., 38 South Dearborn St., Chicago 3, Ill.
WRITE FOR BOOKLET
STOCKED BY LEADING STEEL WAREHOUSES
Inland
4-WAY SAFETY PLATE
Reg. U. S. Pat. Off.

pressure. You can control them by either an electric or manual valve, or both, making them independent of power supply.

Grover Products Co., 1221 S. Hope St., Los Angles 15.



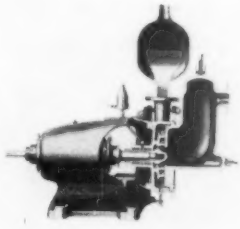
Overcurrent Relay

This overcurrent relay was developed to provide fault protection for most distribution feeders. It picks up loads after outages of sufficient duration have brought the loads of automatic devices onto the lines.

Usually when a feeder is re-energized after an extended outage, the accumulation of loads causes an in-rush current to flow, which often exceeds the minimum value of short circuit current. This relay was designed to protect against such a condition. Its maker claims that it has an extremely inverse time characteristic curve with a shape approximating those of power fuses and distribution cutouts.

Called Type IAC-77, it has the usual features of other overcurrent relays such as time dial, tapped coil, single contact with target-seal-in device, and provision for instantaneous attachment.

General Electric Co., Switchgear Div., Schenectady 5, N. Y.



Self-Priming Pump for Corrosives

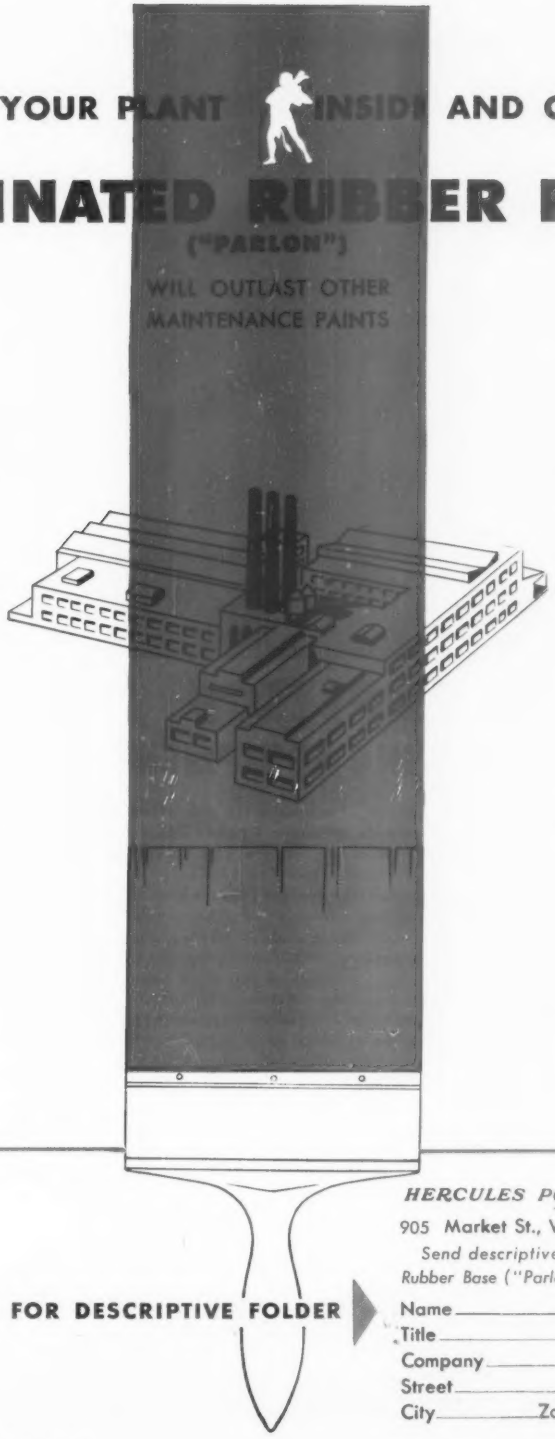
Durcopump is a centrifugal self-priming pump made for handling corrosive solutions. It is made up in any of 12 different corrosion-resisting alloys, and you can convert the wet-end parts from one alloy to another

PROTECT YOUR PLANT INSIDE AND OUT WITH

CHLORINATED RUBBER PAINTS

("PARLON")

WILL OUTLAST OTHER MAINTENANCE PAINTS



RETURN COUPON FOR DESCRIPTIVE FOLDER

HERCULES POWDER COMPANY
INCORPORATED

905 Market St., Wilmington 99, Del.

Send descriptive folder on Chlorinated Rubber Base ("Parlon") Paints.

Name_____
Title_____
Company_____
Street_____
City_____ Zone____ State_____

CR9-1R

"PARLON" IS A TRADE MARK

MORE FOR EVERY LIGHTING DOLLAR!

APPLETON LIGHTING EQUIPMENT

Separable Standard Dome Reflector
Hood is easily detached for cleaning or servicing without disconnecting wires. Weatherproof.

Industrialite High Mounting Fixture
For use in railroad yards and round houses, steel mills, foundries—hundreds of industrial installations.

Type EVX Explosion Proof Fixture
Ruggedly built of tough, malleable iron, this Fixture provides safe, superior illumination for hazardous locations.

Appleton Lighting Equipment is scientifically designed to provide maximum lighting efficiency at minimum installation, service and operating expense.

The manufacture of Appleton Fixtures is quality controlled from raw materials to finished product. Metal parts of reflector are made of pure ingot iron—tough, long-wearing metal that is ruggedly corrosion-resistant. Vitreous-fired porcelain enamel finish provides maximum reflecting efficiency.

Including hundreds of types and sizes, the Appleton Line contains a fixture to fit virtually every lighting requirement, whether indoors or out. Sectionalized construction of all types assures quick, easy servicing. Get the most from your lighting dollar. Specify Appleton, STANDARD FOR BETTER LIGHTING.

Write for Complete Catalog Information.

SOLD THROUGH ELECTRICAL WHOLESALERS

APPLETON ELECTRIC COMPANY

1715 Wellington Avenue • Chicago 13, Illinois

APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

without changing the working dimensions or the power end.

The pump has a large air-handling capacity, and is available in two sizes. One size has a capacity ranging from 20 gpm. against 81-ft. total dynamic head to 160 gpm. against 33-ft. tdh. The other ranges from 40 gpm. against 125-ft. to 240 gpm. against 75-ft. tdh. when operating at 1750 rpm. The evacuating capacity varies with the pump size, diameter of impeller, and speed.

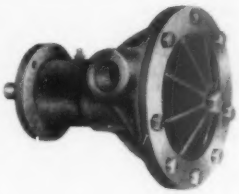
The Durion Co., Inc., Box 1019, Dayton, Ohio.

Sling Chain

Round-Tite sling chain can be locked around your lumber, bales, or other materials for moving. It has a malleable ring on each end, with a stop link eight feet from one end. A forged steel hooking device allows the chain to slip through and tighten against the load. This device has a spring-operated grip trip latch which then locks the chain securely in position.

The tensile strength of the chain is 9300 pounds. You can get it in 18-, 20-, and 22-ft. lengths. Standard chain is $\frac{3}{8}$-in., but it is also made to order in 7/16-, $\frac{1}{2}$-, 9/16-in. chain.

The Cleveland Chain & Mfg. Co., 545 Henry St., Cleveland 5.



Rotary Pumps

Cleco rotary pumps are constructed with floating vanes that are controlled both radially and laterally. They have pressure-controlled mechanical seals which hold both pressure and vacuum.

You can use them to pump gases, air, or liquids of either light or heavy viscosity, and at temperatures up to 212 degrees. Or they will pump part air and part fluid, holding pressure and vacuum at the same time. The maker says that in the power field you can use them as a rotary engine or fluid motor with high starting torque and a wide speed range.

Chicago Laboratory & Engineering Co., 4140 N. Kedzie Ave., Chicago 18.

Seals for Rotating Shafts

Mechanical shaft seals were developed to prevent leaks around rotating shafts. Three kinds are made: standard, abrasive-resistant, and special. The first is for use when a limited amount of abrasive material is present in the liquid being pumped or transferred. The abrasive-resistant seal can be applied to all abrasive liquid conditions. The last type is

*Other Services for CMH Flexible Metal Hose

VIBRATION

CMH Flexible Metal Hose absorbs vibration, isolating its damaging effects upon fixed structures.

MANUAL USE

For mobile service in conducting injurious media, CMH Flexible Metal Hose is the safe method.

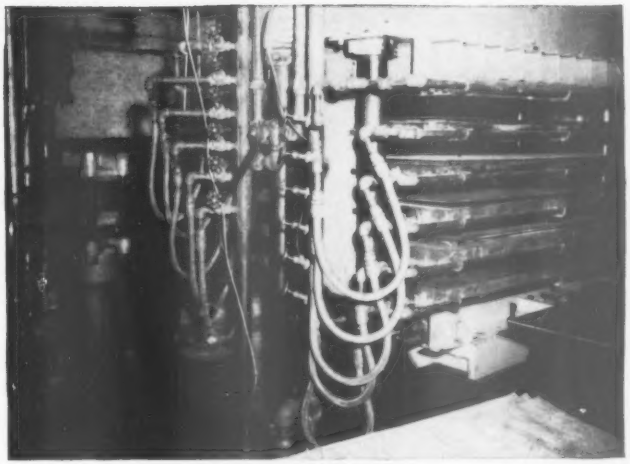
MISALIGNMENT

CMH Flexible Metal Hose is the simple, economical way to correct for misalignment, eliminating the need for complicated expensive hook-ups.

UNINTERRUPTED SERVICE

For installations requiring uninterrupted service, without repeated routine inspection, CMH Flexible Metal Hose is most dependable.

Where connections must withstand *heat and motion...



CMH REX-WELD Flexible Metal Hose

For services where the combination of *heat* and *motion* had made connections difficult to maintain, CMH REX-WELD Flexible Metal Hose is serving economically, dependably and safely. These all-metal assemblies, without packing, have long life free from leakage. There is no aging, deterioration or contamination.

CMH REX-WELD is furnished in steel or bronze in standard sizes from 3/16" through 4" I.D., with or without metal braid covering. Available with a choice of couplings to meet installation requirements.

Write for desired information . . . ask for detailed catalog data.

CMH—ONE dependable source for every flexible metal hose requirement

• CMH manufactures all standard types of flexible metal hose, both convoluted and corrugated, in a variety of metals; expansion joints for piping systems; stainless steel and brass bellows; various conduits and special assemblies of these components.

CHICAGO METAL HOSE CORPORATION

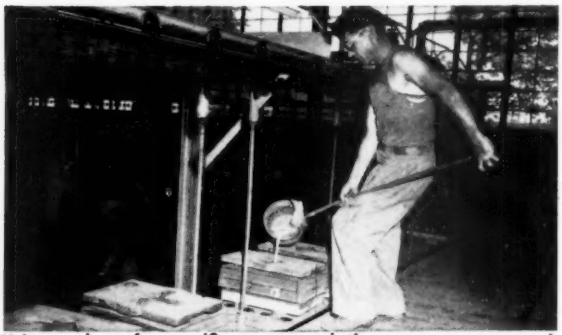
Leaders in the Science of Flexonics
MAYWOOD, ILLINOIS
Plants at Maywood, Elgin and Rock Falls, Illinois
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ontario

Webb Conveyorized production is "paced" production —it moves with a steady, even rhythm that gets results in high volume at low cost, and supplies the *right* parts to the *right* place at the *right* time.

Bottlenecks are avoided . . . piling up of parts is eliminated . . . idleness of machinery from failure of material supply is done away with. Webb Conveyors provide a means to organize production into an orderly, continuous flow, and to provide live storage where needed.

For three decades, Webb has been providing conveyors for the most exacting production in industry. We have an organization which knows its job—knows how to select, design and build the right conveyors for your job.

2892



Write or phone for specific recommendations on your own needs.

JERVIS B. WEBB COMPANY

8951 ALPINE AVE.
DETROIT 4, MICH.

OFFICES IN
PRINCIPAL CITIES

CONVEYOR ENGINEERS AND MANUFACTURERS

made to order in whatever materials are needed to meet any unusual liquid or fluid conditions you may have.

The seal is of the cartridge type. Maker says it will operate on all liquids, the type applied depending on the abrasive qualities of the liquid, corrosion problems involved, and the relative lubricating qualities of the liquid being handled. Water, gasoline, alcohol, hydraulic fluids, ammonia, brine, as well as concentrated or boiling acids and salts can be sealed, with maximum pressures up to 400 psi.

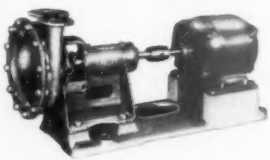
Peerless Pump Div., Food Machinery & Chemical Corp., 301 West Ave. 26, Los Angeles 31.

Crawler-Mounted Crane

You can convert this 7.5-ton crane, Model 66, to a magnet, ½-yd. dragline, clamshell, shovel, or trench hoe. The crawler assembly is powered through its propeller shaft assembly from a direct-power-flow transmission, remotely located to minimize noise and backlash. The bearing length of the crawler is 8 feet 5 inches; its 8-ft. width makes for stable 360-deg. operation. Self-cleaning, nonclogging treads can be used with grousers.

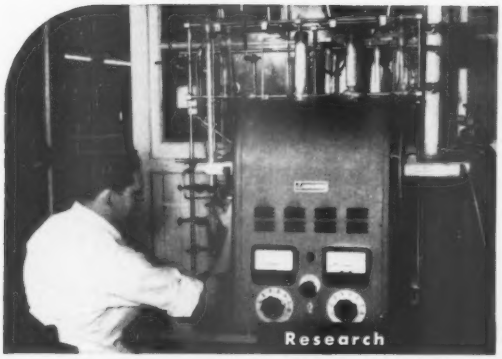
The crane has an all-welded chassis, and travels, lifts, booms, and swings simultaneously or independently. The swing speed is 6.2 rpm. Standard power unit is a 6-cylinder gasoline engine which develops 62 hp. at 1800 rpm.

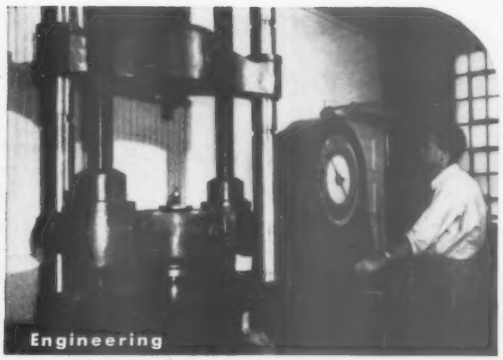
Wayne Crane Div., American Steel Dredge Co., Inc., Ft. Wayne 1, Ind.



Stainless Steel Pumps

Line of stainless steel centrifugal pumps is intended for handling corrosive liquids. There are eight sizes





WHICH

N.B.M. service is most important

FOR PRODUCING BETTER BRONZE BEARINGS AND CASTINGS?

The answer is that *ALL FOUR* are equally important . . . and ALL FOUR represent the reasons why more and more users of Non-Ferrous Bearings and Castings become N-B-M Customers.

The complete facilities of National Bearing Division for Research, Engineering, Production and Finishing are unique. They represent an important *chain of service*—an ability to translate your *problems* into *requirements*, and requirements into *actual products* that serve you better.

The most modern equipment for alloy testing, molding, casting and finishing assures you of finer, more dense, closer-to-size bearings and castings—products that have higher resistance to wear and greater long-range economy.

Yes, this complete N-B-M Service is worthwhile investigating. Call in your nearest N-B-M Representative—he will gladly show you how this service can be geared to serve you with maximum efficiency.

THIS NEW CATALOG completely describes N-B-M Facilities—how they can cut costs for you and tie in with your own production. Write for a free copy today.

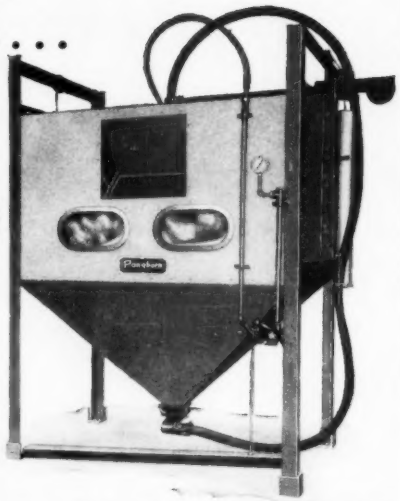
AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

If you clean metal parts . . .



HERE'S A FASTER, BETTER, CHEAPER WAY!

Now you can clean metal parts *at a profit! Remove* scale, rust, grime, dirt, paint, gum from metal in a few seconds. *Produce* a clean, smooth surface at low cost *far faster than by hand* with this Pangborn Blast Machine!

QUICK, EASY, ECONOMICAL

No experienced operator needed. Unit is compact, saves valuable shop floor space . . . in most cases present air supply operates the Pangborn Blast Machine. Initial cost is surprisingly low and there are models to fit your specific job.

FULLY GUARANTEED

Made by Pangborn, manufacturers of more than 25,000 machines now serving industry and backed by 44 years of know-how, the performance of these Blast Machines *is guaranteed.* Send us your problem today . . . we'll send you full information by return mail. Mail the coupon now!

MAIL COUPON TODAY!

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job.

PANGBORN CORP., 282 Pangborn Blvd., Hagerstown, Md.
Please send me information on Pangborn Blast Machines.
I now clean _____
Name _____
Company _____
Address _____
City _____ Zone _____ State _____

available to provide capacities ranging up to 750 gpm and heads up to 180 feet depending on the capacity.

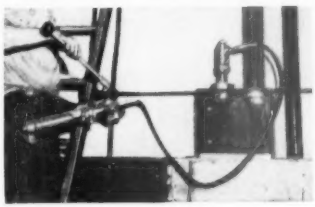
Goulds Pumps, Inc., Seneca Falls, N. Y.

Hand Truck for Large Flat Loads

With this small 4-wheel hand truck, Rol-Away Model C., one man can handle large-size flat loads such as sheetmetal, glass, plywood, flat cases, or other odd-dimensional material. It is made of aluminum alloy pipe which fits into an angle steel base. Its dimensions are 48 inches high, 45 inches long, 28 inches wide.

Although it weighs only 50 pounds, the truck carries up to 600 pounds on 4-in. casters, or 1200 pounds with 6-in. casters.

Honeyman Mfg. Co., 1217 N.W. Everett St., Portland 9, Ore.



Hydraulic Knock-Out Punches

Hollow-type 10-ton hydraulic ram converts knock-out punches from hand operation to power. The hydraulic unit, called Porto-Power RC-426, is combined with four knock-out punch assortments for conduit of various sizes ranging from ½ to 4 inches.

Maker claims that the use of hydraulic power prevents distorted or loosened boxes, makes true, uniform holes, and saves you from the trouble of heavy wrench swinging.

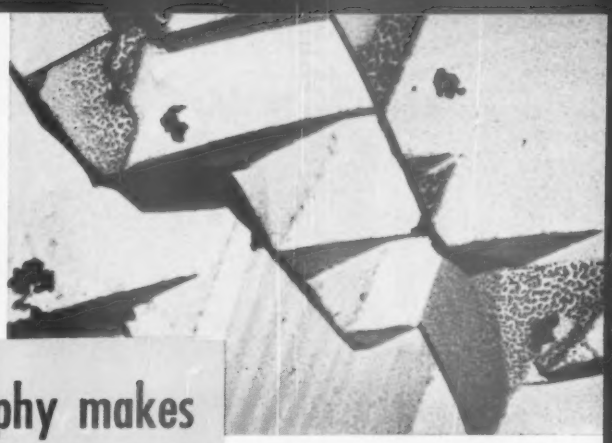
Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee 1.

Flaring and Burnishing Tool

Three rollers in the spreader cone of the Rol-Air flaring tool maintain the original wall thickness of the tubing being flared. The maker explains that they don't form the flares against a block, but roll them out with the tubing extended above the face of the flaring block. This is said to result in a strong flare which will stand up well under vibration.

After the tubing is flared, you can burnish it by turning the control knob of the operating handle a cou-

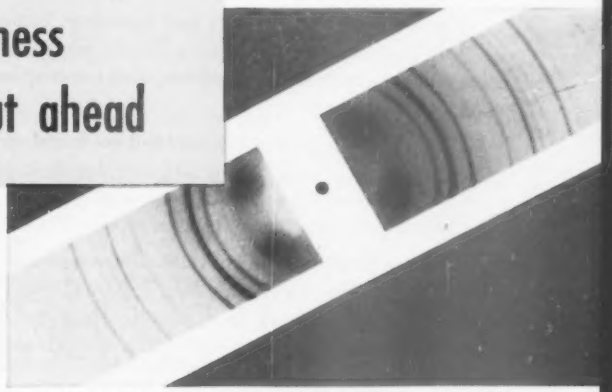
DISPLAYS MASSIVE PRODUCTS—A Diesel locomotive can roar across the Rockies—all on a movie screen in a prospect's office. All because photography can take huge things or small, and make them of a size for a salesman, teacher, or demonstrator to show.



MAKES MICROSCOPIC DETAILS CLEAR—Photography takes great magnifications produced by the electron microscope (20,000X) on fine-grain Kodak plates, enlarges and records them up to 100,000X on Kodak projection papers. Previously undetectable details and new facts are revealed.

Photography makes big things small—small things big—and business comes out ahead

REDUCES FILING SPACE BY 98%—With microfilming, bulky records can be reduced and stored on a few rolls of film. 675 drawings, 24" x 36", can be recorded on a 100' roll of 35mm. Recordak or Kodagraph Micro-File Film. And everything is quickly ready for reference in the Recordak or Kodagraph Film Reader.



REVEALS STRUCTURE AND CONDITION OF METALS—X-ray diffraction patterns on Kodak films or plates provide important information concerning the crystal structure of metals. These patterns help show how alloys can be improved or new alloys made—give data on the effect of machining, drilling, and punching upon the structure of the material.

With the speed of a flick of light, photography can reduce or enlarge accurately to scale, and without missing the tiniest detail. And that's not all.

It can magnify time with the high speed motion-picture camera so that the fastest motion can be slowed down for study. It can record the penetrating x-ray and reveal internal conditions of materials and products. With movies and stills, it can repeat a story, time and again, without the loss of a single detail.

Yes, photography serves business and industry in many important and valuable ways. It can work for you, too. If you would like to know how, please feel free to write for literature, or for specific information which could be helpful to you. Eastman Kodak Company, Rochester 4, New York.

FUNCTIONAL PHOTOGRAPHY

serves industrial, commercial, and scientific progress

Kodak

TRADE-MARK

BECAUSE THEY ARE QUIET and fume-free, battery industrial trucks can be used in virtually any part of the plant. They can even be provided with spark-enclosed construction if fire and explosion hazards exist.

They use low-cost electric power and use it with peak efficiency . . . starting instantly, consuming no power during stops. Their electric motors have few wearing parts; are easy to maintain; rarely need repairs. Thus they have inherent economy and dependability.

They are doubly dependable and economical when powered by EDISON Nickel-Iron-Alkaline Storage Batteries. These are the longest-lived and most durable of all batteries, with steel cell construction, electrolyte which is a preservative of steel, and a foolproof principle of operation.

If you do not already use EDISON, get a current price quotation —you will probably find initial cost *much lower* than you think. Couple this factor with well-known EDISON long life and you will have the key to year-after-year economy.

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.

EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES

EDISON STORAGE BATTERY DIVISION
of Thomas A. Edison, Incorporated, West Orange, N. J.
In Canada: International Equipment Co., Ltd., Montreal and Toronto

ple of turns. This gives you a finished face on the flare for tight joints.

The tool has a die holder with heat-treated sliding dies that won't score the tubing. It will flare and burnish copper, brass, or aluminum tubing from ¼- to ⅝-in. O.D.

The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7.

Uncorrected-Power-Factor Ballasts

All of the basic components of this line of 30-, 32-, and 40-watt uncorrected-power-factor ballasts for fluorescent lamps have been redesigned to reduce the noise of operation to a minimum. Dimensions have also been changed to permit their use with a wide variety of fluorescent fixtures.

General Electric Co., Specialty Transformer & Ballast Divs., Schenectady 5, N. Y.

Solvent

Here is a chemical for loosening stuck-together parts. It's called Kroil, and put up in a handy container that you can grab quickly to open up a tight-fitting cover or use whenever a frozen bolt, nut, or bearing threatens to tie up production. It shoots the solvent right where you need it, and the manufacturer claims the liquid will creep into millionth-inch spaces to loosen dried oils, rust, and corrosion, and supply lubrication to free the part, without harm to the metal.

Kano Laboratories, 75 E. Wacker Dr., Chicago 1.

Diesel-Driven Portable Air Compressor

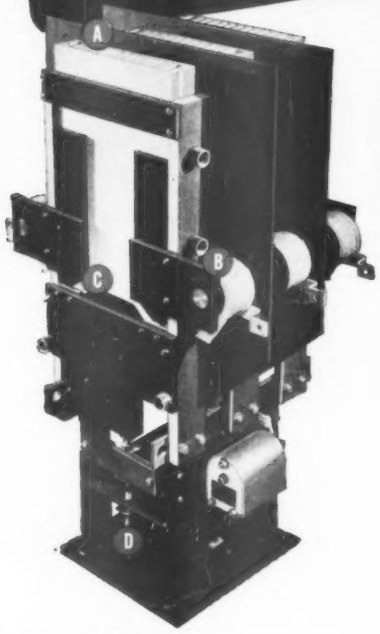
For full diesel-engine drive on your portable air compressor, this 500-cfm. Mobil-Air uses an International Harvester heavy-duty UD-24 engine. There is a choice of three sizes of engines, and the unit features a floating-speed regulator to slow down the compressor to just enough air to hold the pressure.

The unit is a 2-stage air-cooled com-

NOW! Save Space..

ALLIS-CHALMERS New High Voltage Air Contactor

Increase Contact Life



FOR THE FIRST TIME a High Voltage Air Contactor with double break contacts and direct vertical action is now available! This design eliminates turning shafts, shaft bearings and flexible contact leads . . . cuts maintenance.

Contact life is increased! Movable contacts are self-aligning. Contact inserts of arc resistant alloy assure clean, long wearing contact surfaces.

Measuring only 15 x 25 x 38 inches, the Type 256 Air Contactor combines three methods of arc extinction to permit its compact design. 1. Double break contacts cut arc voltage in half. 2. Dual continuous duty blowout coils snuff out low current arcs, speed the upward movement of higher current arcs. 3. Special arc chutes stretch arcs both horizontally and vertically.

Built for general alternating current motor starting applications, it has a simple, rugged design which makes it especially adaptable to heavy duty applications requiring frequent starting, inching, reversing, plugging, or dynamic braking.

The Type 256 Contactor is available in ratings of 200 and 400 amperes at 2500 volts, 200 amperes at 5000 volts.

The Allis-Chalmers line of High Voltage Starters has been expanded to include the Type 256 Contactor. Utilize the advantages of this completely tested unit. Call your nearby A-C Sales Office or send coupon today.

A SPECIAL ARC CHUTES
B DUAL BLOWOUT STRUCTURE
C DOUBLE BREAK CONTACTS
D VERTICAL ACTION MAGNET

Allis-Chalmers High Voltage Starter equipped with Type 256 Air Contactor.

ALLIS-CHALMERS

SEND FOR MORE INFORMATION

ALLIS-CHALMERS, 1078A SO. 70 ST.
MILWAUKEE, WIS.

Gentlemen:

Please send advance information on the New Type 256 High Voltage Air Contactor.

Name _____

Title _____

Company _____

Address _____

City _____ State _____

A-2843

The blade of every Stanley Screw Driver is hardened in a pyrometer-controlled electric furnace.

No. 1006 Composition handle. Patented bolster construction. Standard blade and tip.

No. 45 Hardwood handle. Patented bolster construction. Small blade with parallel-sided tip.

No. 25 Hardwood handle. Patented bolster construction. Standard blade and tip.

Scientific heat treatment is only one of the reasons why Stanley Screw Drivers last longer ... give more dependable service. Just one of the many EXTRA steps included in the manufacture of Stanley quality Screw Drivers.

All Stanley Screw Drivers have tough, fine alloy steel blade, highly polished. Strong, comfortable, palm-fitting handle. Accurately cross-ground blade tip that holds firm in screw slots.

You save when you standardize on Stanley Screw Drivers... they last longer. Available in a wide variety of types and sizes for every industrial need. Ask your distributor for Stanley Tools... and save. Stanley Tools, New Britain, Connecticut.

THE TOOL BOX OF THE WORLD

STANLEY

Reg. U.S. Pat. Off.

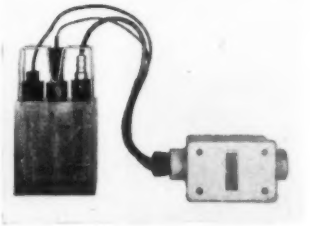
HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING

pressor, with a Hydro-Shift Flex-Disc clutch, channel valves, air cleaner, sturdy running gear and mounting.
Ingersoll-Rand Co., 11 Broadway, New York 4.

Power Transmission

Called the Augur Movement, this power transmission converts and reduces a constant speed input to produce a quick-reversing action that interrupts the rotation of the output shaft every 45 degrees of travel. The maker says that the interrupting action is a short back-up motion occurring about eight times in one complete revolution of the shaft, that it is smooth and continuous throughout the cycle of operation, and that the reversing action doesn't develop a torque counter to the shaft rotation.

You can use it as a power transmission for such jobs as tumbling barrels, screw-feed stokers, cement mixers, or deep well drills. It may also be used to agitate shake-out screens, hopper feeds, for mixing paints or chemical compounds, or for buffing and polishing, pipe threading, valve grinding, or floor sanding machines. It operates at any specified speed from any rotary power source.
Metal Seal & Products, Inc., 21833 St. Clair Ave., Euclid 17, O.



Waterproof Electrodes

Two pH electrode assemblies for use with the manufacturer's recorders and controllers feature waterproof design. One assembly is for continuous sampling lines, the other for immersion in open channels and tanks.

The sampling line assembly has low capacity, said to permit a high flow rate and minimize the coating of electrodes by suspended material. Operating pressure can be up to 15

Plastics where plastics belong

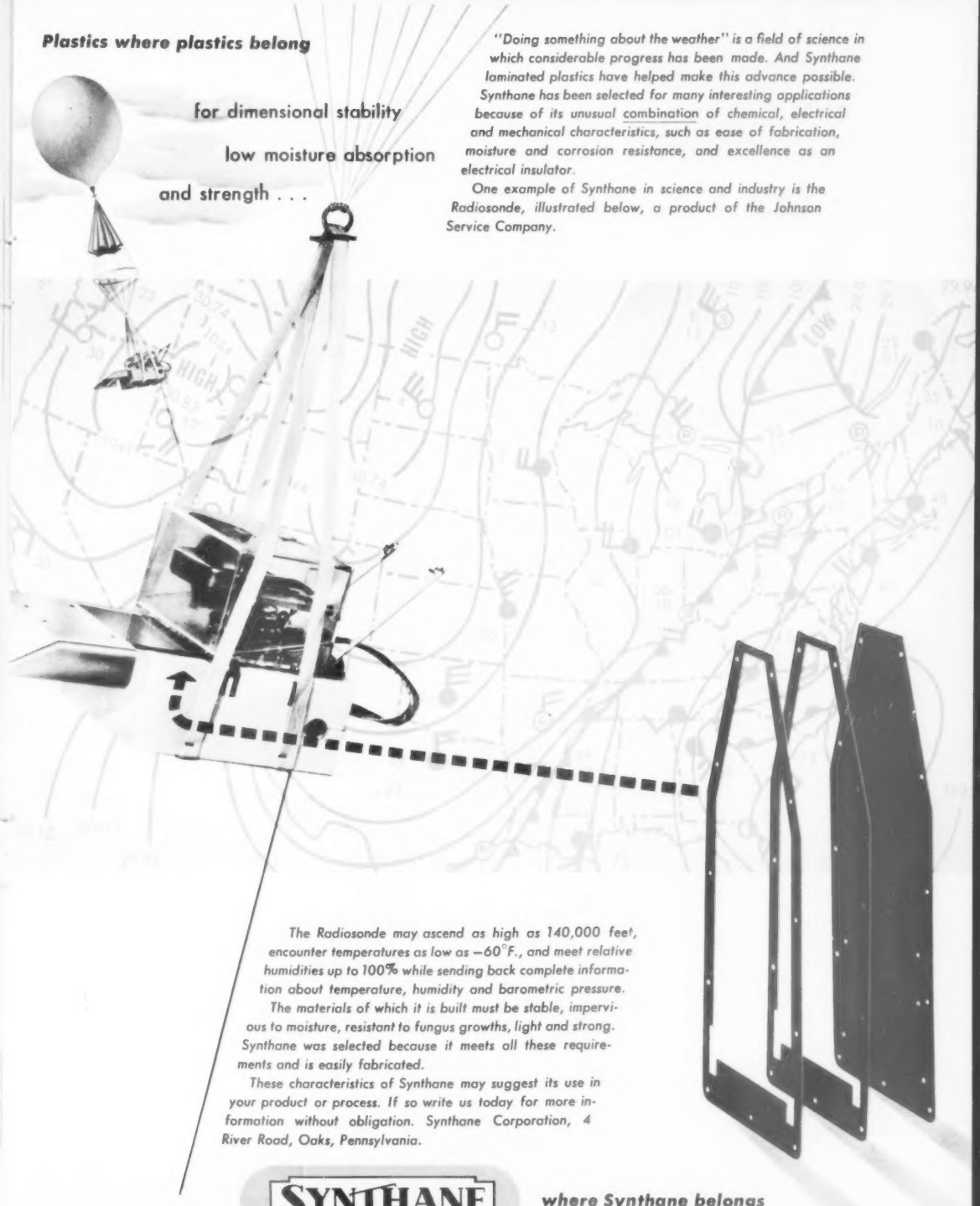
for dimensional stability

low moisture absorption

and strength . . .

"Doing something about the weather" is a field of science in which considerable progress has been made. And Synthane laminated plastics have helped make this advance possible. Synthane has been selected for many interesting applications because of its unusual combination of chemical, electrical and mechanical characteristics, such as ease of fabrication, moisture and corrosion resistance, and excellence as an electrical insulator.

One example of Synthane in science and industry is the Radiosonde, illustrated below, a product of the Johnson Service Company.



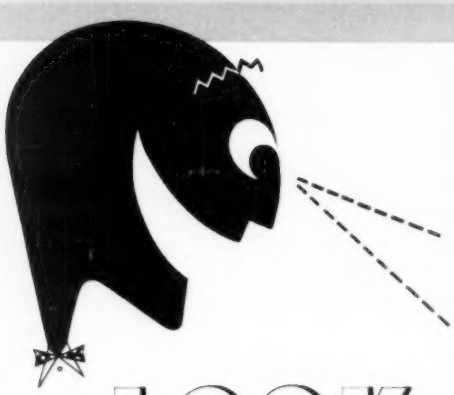
The Radiosonde may ascend as high as 140,000 feet, encounter temperatures as low as −60°F., and meet relative humidities up to 100% while sending back complete information about temperature, humidity and barometric pressure. The materials of which it is built must be stable, impervious to moisture, resistant to fungus growths, light and strong. Synthane was selected because it meets all these requirements and is easily fabricated.

These characteristics of Synthane may suggest its use in your product or process. If so write us today for more information without obligation. Synthane Corporation, 4 River Road, Oaks, Pennsylvania.

SYNTHANE

where Synthane belongs

SHEETS • RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED • MOLDED-MACERATED



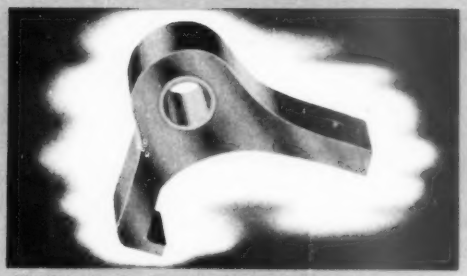
LOOK

at the extra values

Over at the right are four parts made of Synthane laminated plastics. Synthane was selected for these important jobs because of one or two mechanical, chemical or electrical characteristics. In each application the user found that Synthane was not only a better material in the major requirement but it gave him a valuable and desirable extra by reason of other beneficial properties. This is true of almost every Synthane application because our type of laminated plastics is unusual for its *combination* of values.

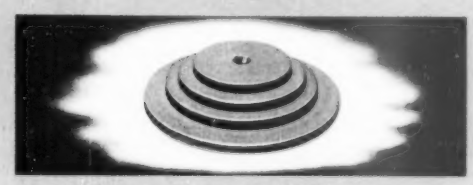
Synthane is strong, light, hard, and dense. An excellent electrical insulator, it has high dielectric strength, low dielectric constant, and low power factor. Highly resistant to moisture, abrasion, corrosion, and wear, Synthane is easily worked on production equipment. It is a *set* plastic, dimensionally stable over wide variations of temperature.

If these few of Synthane's many desirable properties and abilities suggests its use in your product or process, clip and mail the coupon today, let us help you with materials, design or fabrication of parts.



Distributor Breaker Arm. *Manufacturer sought good wear resistance and electrical insulating ability. His extra values: Impact fatigue resistance, low moisture absorption, vibration absorption.*

Piping for Nylon Sizing Machine. *Designer needed good corrosion resistance. His extra values: Light weight, strength.*



Vee Belt Pulley. *User required light weight. His extra values: Wear resistance, stability, low power loss, reduced lubrication problem.*

Hosiery Examining Form. *Processor looked for smooth, non-sagging surface. His extra values: Rigidity, light weight, black finish all-the-way-through, freedom from warping, hardness.*

FOR MORE INFORMATION ABOUT YOUR EXTRA VALUES

SYNTHANE CORPORATION, 4 River Road, Oaks, Pa.

Gentlemen:

Please send me without obligation a complete catalog of Synthane technical plastics.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

SYNTHANE

PLAN YOUR PRESENT AND FUTURE WITH SYNTHANE TECHNICAL PLASTICS • SHEETS RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED MOLDED-MACERATED

pounds. The body of the assembly is a single block of clear plastic, 4¼x 1⅜x4¾ inches. Inlet and outlet connections fit standard ¼-in. pipe.

The immersion unit can be used at a depth of 10 feet, or greater with longer lead wires. It consists of a plastic head, measuring elements, and a junction box. The unit is supplied with either a steel bar guard or a perforated sheet metal guard.

The electrodes and temperature compensating elements feature lead wires molded into plastic heads to prevent electrical leakage. All three elements—glass electrode, calomel electrode, and temperature element —screw into place against neoprene gaskets. In case of breakage, they may be replaced.

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44.

Materials Handling Truck

The Kal-Truk accommodates two different types of materials-handling bodies. It is built like a tractor, with three speeds forward and reverse. It is powered by a 13-hp. 2-cylinder air-cooled engine.

When equipped with its 2/3-yd.-capacity dump body, it can be loaded directly from hoppers, bins, or mixers to move your materials right to the spot where they are needed.

The platform body has a tilting feature for quick removal of the load. It is equipped with all-steel side and end gates.

Kalamazoo Mfg. Co., Kalamazoo, Mich.

Handwheel Valve

Continuously connected handwheel control valve was designed to eliminate bypass installation. The handwheel is built integral with the superstructure of the control, and is powerful enough to operate the con-

ACME STEEL CO. CHICAGO

9 out of 10 companies can save on shipping with ACME STEELSTRAP

HERE'S HOW EBCO DID IT. Ebco Manufacturing Company, Columbus, Ohio, package their water coolers using Acme Steelstrap and Acme Equipment. They report a saving of 33% in materials and time over previous packaging method.

In addition, using Acme Unit-Load Band for freight car shipments, this company has obtained savings of 25% in dunnage materials, 50% in loading time and labor, and 90% in reduction of breakage and damage claims.

Find out how an Acme Shipping Specialist can help you. Call him (no obligation, of course) — or mail the coupon today for free booklet of case studies, "Savings in Shipping."

Close-up of the Acme No. 3 Steelstrapper *showing application of Acme Steelstrap which saved 33% in packaging cost*

STRAPPING DIVISION

ACME STEEL COMPANY

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

ACME STEEL COMPANY, Dept. FM-129
2838 Archer Avenue, Chicago 8, Illinois

Please send me a copy of your case history booklet. "*Savings in Shipping.*"

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

THE SAME PRINCIPLE

THAT SPEEDS THE FAMOUS ILLINOIS CENTRAL DIESEL-ELECTRIC

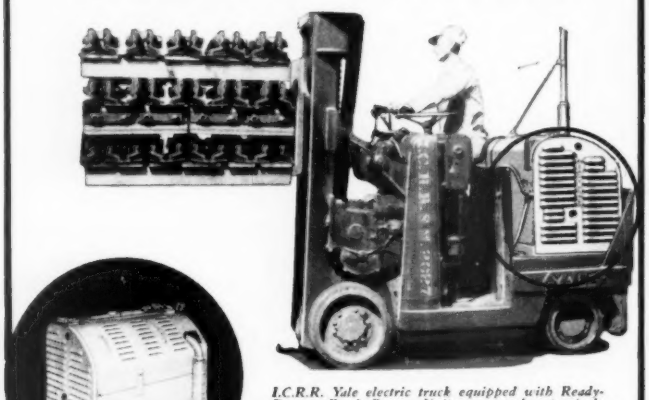
"City of New Orleans"

READY-POWER

GAS-ELECTRIC POWER UNITS

FOR CONTINUOUS ELECTRIC TRUCK OPERATION

A combustion engine coupled to a direct current generator provides the constant power, flexibility and economy for which modern Diesel-electric streamliners are noted. This same principle of power is applied to electric trucks by equipping them with Ready-Power Units. Dependable electric power, generated on the truck chassis, permits operation at constant speeds for unlimited periods. All makes of electric trucks can be converted to Ready-Power. Specify Ready-Power for new trucks.



I.C.R.R. Yale electric truck equipped with Ready-Power. Ready-Power Units are used extensively in Illinois Central warehouses and repair shops.

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

trol valve manually, regardless of the air pressure on the diaphragm or in opposition to the spring.

You can position the valve plug by hand under any conditions by turning the handwheel to the poistion you want. You can shut it tight or block it wide open. An indicator automatically shows the position of the valve plug as well as the setting of the travel stops. You can see at all times the percent of free travel of the valve plug, and exactly in what portion of the valve stroke the free travel can occur.

Hammel-Dahl Co., 243 Richmond St., Providence 3, R. I.

Speed Reducer

Any ¼-in. electric or air drill can be converted into a multi-purpose tool with this speed reduction unit. Called Grip-Torc, it incorporates a geared mechanism (not a friction drive) said to increase torque output approximately 5 to 1.

It is controlled by gripping or releasing the body of the unit. This starts or stops the working tool, while the drill motor still continues to run. Overloading of the work is eliminated, as the body of the unit automatically slips in the hand if work jams.

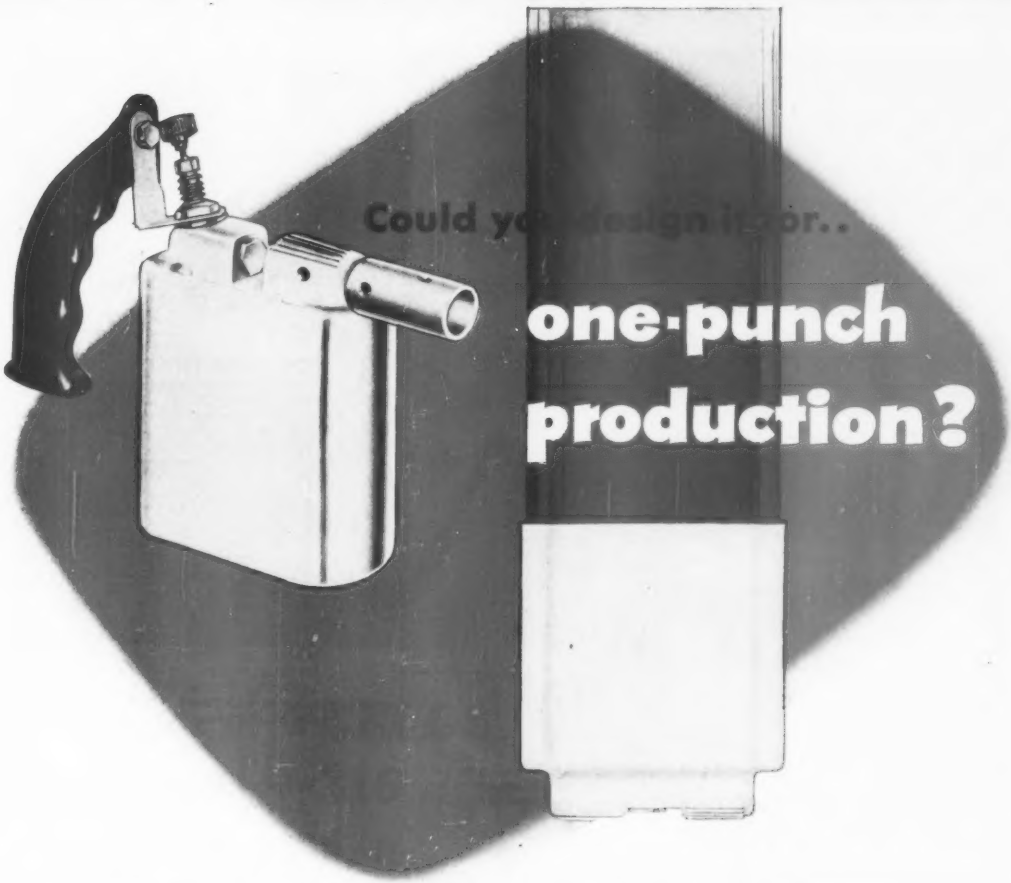
With the reducer attached to your drill you can do heavy-duty boring, reaming, screwdriving, and nut running. It lets you use a 1¾-in. bit in wood, a ½-in. metal drill or a 3-in. hole saw in steel.

McLaughlin & Co., 909 E. 59th St., Los Angeles 1.

Belt Sander

You can use this 3-in. belt sander either as a stationary or portable machine. For stationary use, you can mount it either horizontally or vertically, and power it by an electric motor and pulley. A combination stop and fence unit which tilts to 45 degrees can be attached on either end, making possible a variety of sanding operations, on wood, metal, or other surfaces.

Since it weighs only four pounds, it can also be used as a portable machine by powering it with an electric



Alcoa's Impact Extrusion process formed this blowtorch housing—charging well, torch tube housing, handle and valve mounting—with just one punch!

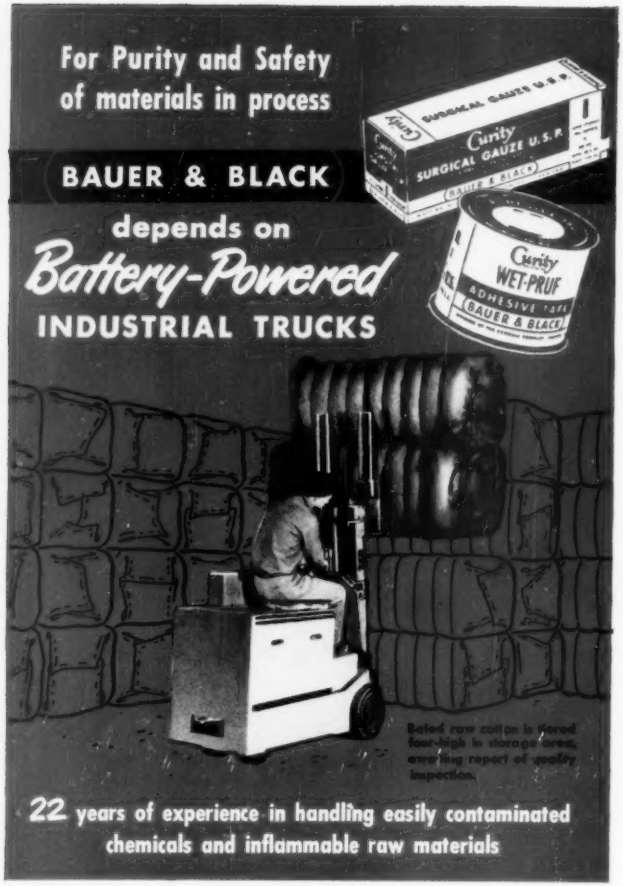
Impact extrusions can often give you any symmetrical shape at substantially lower cost than spinning, stamping, drawing or machining; widest choice of finishes, too—from as-delivered to patented Alumilite. You get all these in addition to Alcoa Aluminum's light weight, strength, corrosion resistance, handsome appearance.

Get the whole story about how this versatile process can give your product more sales appeal at lower cost! Call your nearby Alcoa sales office. Or write for your free copy of "Alcoa Aluminum Impact Extrusions" to ALUMINUM COMPANY OF AMERICA, 2126M Gulf Bldg., Pittsburgh 19, Pa.

ALCOA *Aluminum* **IMPACT EXTRUSIONS**

ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS



Cleanliness is a must at the Chicago plant of Bauer & Black —a Kendall Company division. Also protection of combustibles, since some of the products moved about and stored are highly inflammable; for instance, the thousands of pounds of raw cotton handled daily, or several of the chemicals used in treating finished products.

Twenty-two years ago Bauer & Black helped achieve both these objectives in material handling by purchasing their first battery-powered industrial truck. Additional battery-powered trucks followed. Now electric industrial trucks are an essential part of the production method at Bauer & Black's plant. A plant official says "their natural ruggedness of construction keeps the trucks in operation at all times and available when they are wanted. We have had very little maintenance, even with our oldest trucks."

Another example of electric truck cleanliness and safety helping industry—while providing material handling *at lowest cost per unit moved.* This criterion, rather than initial investment, explains why "America's Top Industries Prefer *Battery-Powered* Trucks!"

THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION
3701F North Broad Street, Philadelphia 40, Pa.

drill, flexible shaft, lathe, or any other machine tool with a chuck capacity of 5/16 inch.

Johnson Mfg. Co., Lincoln Park 7, R. I.

Hydraulic Pump

Air-operated pump has its motor so arranged that it runs continuously by holding open the valve which controls the air supply. A reciprocating valve alternately diverts the air pressure from one side of the air piston to the other. This air piston is directly connected to a smaller hydraulic piston which pumps oil under high pressure.

The pump has a built-in release valve to permit pressurized oil in the hydraulic cylinder to return to the reservoir by gravity. A 3-position, 4-way valve operates the release and controls the pumping action.

You can use the pump on elevating tables, positioners, strip and sheet feeding tables, or other equipment requiring similar pump specifications.

Lyon-Raymond Corp., 3259 Madison St., Greene, N.Y.

Wiping Cloth

Lint-free wiping cloth, Nun-Lint, is made of cotton bound by plastic. You can use it for polishing, wiping, dusting. To clean it, soak it in sudsy water, squeeze it out, and hang it up to dry. Its maker says you can use it over and over again.

Rittenbaum Bros., Inc., 691-701 Houston St. N.E., Atlanta, Ga.

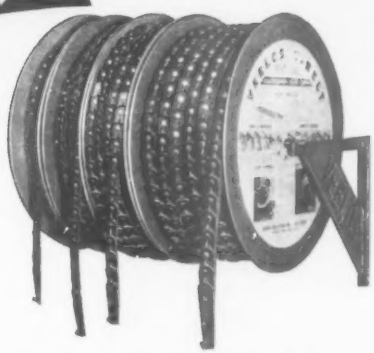
Adjustable Truck-Loading Ramps

Truck-loading ramps with a side weave to compensate for uneven truck floors are made with either hydraulic or mechanical adjusting systems. They bridge the difference in levels between the truck and the loading dock. The 4-way safety floor plate used is rugged enough to hold heavy power fork trucks, as well as smaller hand lift or panel trucks.

The ramp is set into a recess in the loading dock floor. When the truck backs in for unloading, the front lip of the ramp is raised. When the truck is in position, this lip is lowered until it rests on the truck floor, making a smooth path into the body of the truck.

The lip floats with the motion of the floor; as the truck is loaded and the springs settle down, the ramp moves with it to maintain that even path. If the truck springs are uneven, making it higher on one side than the other, the side weave feature keeps the lip flush with the floor.

Ramps are made in 12-, 8-, and 5-ft.



4 reels of VEELOS can replace 316 sizes of endless v-belts

HAS your v-belt inventory grown too large, too costly and too complicated by too many sizes of endless v-belts? No matter what size your inventory, Veelos can cut it—drastically!

Let's assume that you use O, A, B and C widths. With only four reels of Veelos you can make up more than 316 sizes of endless v-belts. If you use only A and B sizes, your entire v-belt inventory will be complete with just two reels. Any length belt is quickly uncoupled from a reel, made endless and installed.

Ease and speed of installing Veelos lowers machine downtime. On drives with outboard bearings, it is installed without moving the motor or dismantling the machine.

FREE VEELOS CATALOG shows how Veelos can bring many distinct v-belt advantages to your plant. See page after page of illustrations of Veelos at work in industry after industry. Full engineering data is given. Write for your free copy today.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

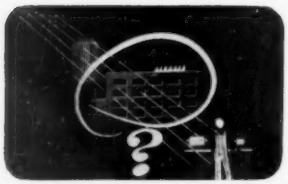
VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

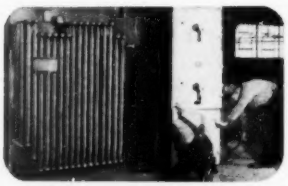
Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 300 distributors throughout the country. Veelos is known as VEELINK outside the United States.

What do you gain from BETTER POWER DISTRIBUTION?

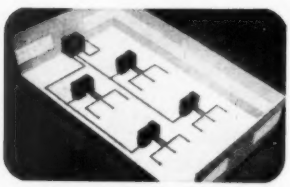
See this film and find out!



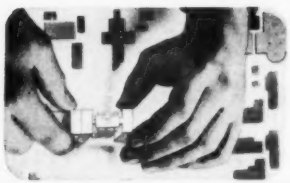
1. "MODERN INDUSTRIAL POWER DISTRIBUTION" is a slidefilm prepared by General Electric to promote a better understanding of power distribution, its importance and its cost. Easy-to-follow diagrams (above) keep this sound slidefilm . . .



2 . . . from being needlessly technical. It's invaluable in planning modernization intelligently. Much emphasis is given to the hard, practical aspects of power distribution like flexibility and ease of installation (above). But, the high point of the film is the way . . .



3 . . . it dramatizes Load-Center Power Distribution (above). Convincingly, the audience sees how a large power system is broken up into a number of small independent systems so that a failure in one system will not affect the others.



4. The film shows how load center substations are like "building blocks" (above) and can be added whenever and wherever needed. Cost-conscious executives looking for ways to reduce maintenance of distribution equipment will be interested in . . .

5 . . . the outstanding installations of fully enclosed switchgear (above). In fact there's hardly an idea in this film that won't appeal to the men you depend on for power savings. To convince you of this, we'd like to send you this helpful . . .

6. POWER DISTRIBUTION MANUAL . . . FREE! It's packed with specific data you'll want! Don't fail to send for your copy now. [The complete program consists of the 35mm slidefilm, 33⅓ RPM record, manual and booklets.] MAIL THE COUPON TODAY!

FREE
to business management!

General Electric Co., Section A684-15
Schenectady 5, N. Y.

Attach to your business letterhead

☐ Please send me a complimentary copy of the G-E Load-Center Power Distribution Manual (GES-3411).

☐ I'd like to borrow the sound slidefilm for showing to my organization.

Name _____ Title _____

Company _____

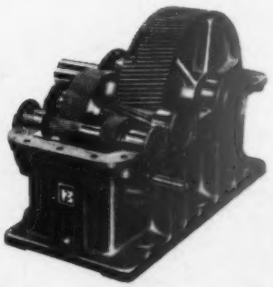
Street _____

City _____ State _____

GENERAL ELECTRIC

lengths; widths are 6½, 6, and 5 feet. The 8- and 12-ft. ramps will carry 10 tons distributed load; the 5-ft. model, 6 tons.

Arthur S. Hamilton, Jr., 154 East Ave., Rochester 4, N. Y.



Enclosed Gear Drives

Line of Maxi-Power enclosed helical gear drives is made in single, double, and triple reduction types. They feature accuracy of gear tooth generation, close tolerances, and reinforced housing design. The maker says that the construction of the drives permits selection of smaller size, lower weight units than have previously been possible.

Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago 9.

Snow-Plow Attachment

Combination snow-plow tractor is powered by a 1½-hp. gasoline engine. The snow plow has a 25-in. adjustable-angle curved blade.

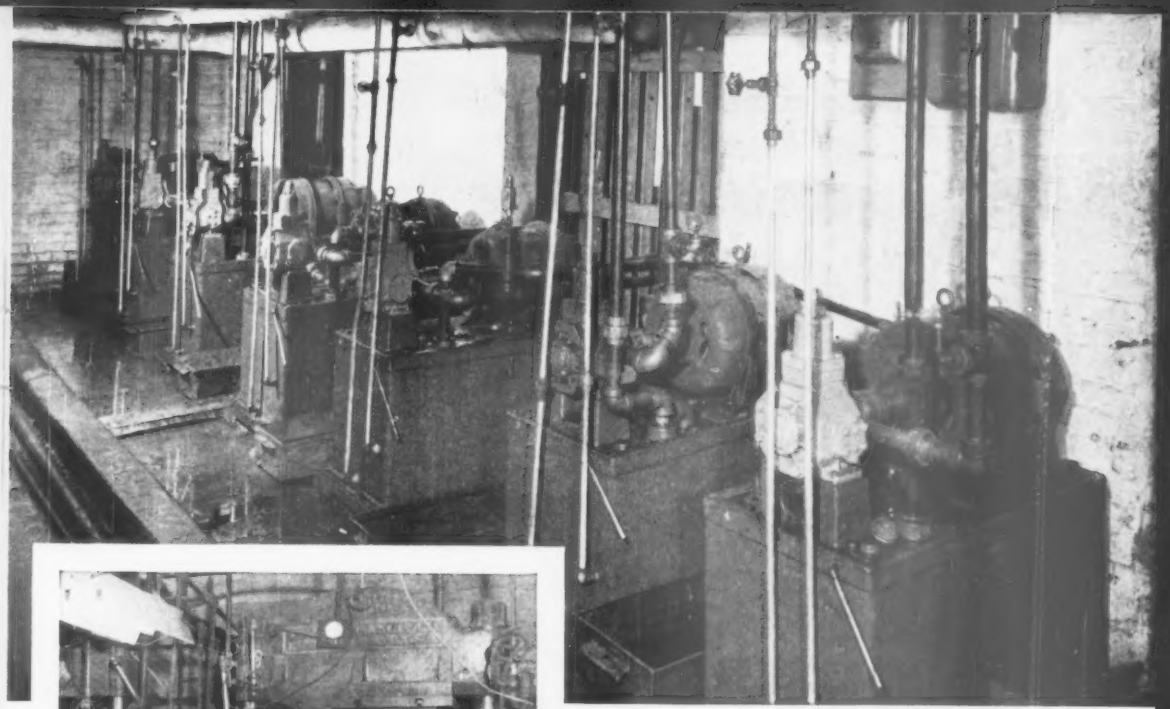
The tractor itself has a 16-in. diameter drive wheel with 6-in. wide tread. Other attachments include a tool hitch for hookup to a lawnmower, a sickle bar for weed mowing, and a cultivator.

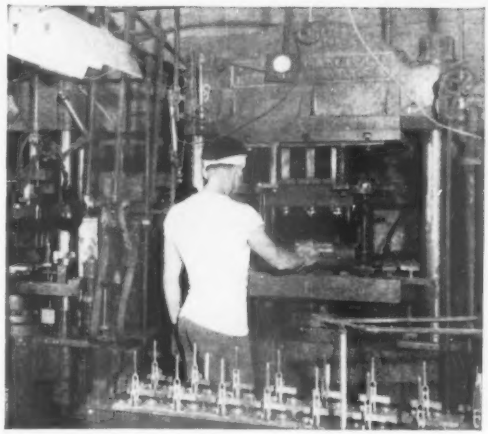
George Tractor Div., Community Industries, Sullivan, Ill.

Deodorant Cleans

Cleaning powder called Quick-San is also a deodorant. It works on the adsorption principle to neutralize unpleasant odors—odor particles are attracted and adhere to the surface of the fine grains of the powder.

When it is used in washrooms, toilets, or other places, it should be sprinkled in the fixtures and allowed to stand a few minutes. This





Stanoil 95 Industrial Oil

Are your hydraulic operations as free of trouble as this?

THE HYDRAULIC UNITS shown above are used for the operation of plastic-moulding presses in a midwest plant. Hydraulic oil pressures reach 2500 psi. Oil temperatures average between 120° and 130° F. Presses, operating on a three-shift basis, require 24-hour operation of the hydraulic units.

Stanoil 95 has been used as the hydraulic medium in these units for well over a year. During this period of hard, continuous service, the hydraulic oil systems have required no cleaning. No oil changes have been necessary. Hydraulic controls have functioned smoothly.

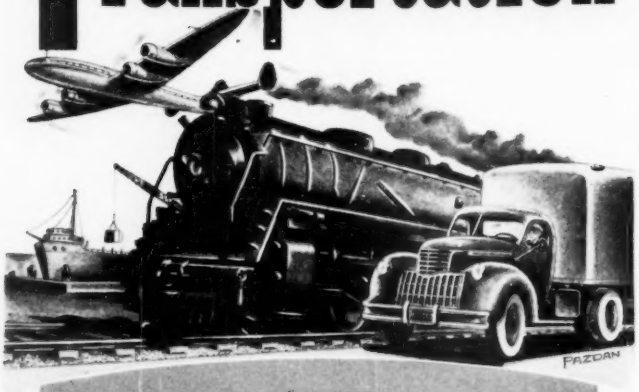
How does this hydraulic oil performance compare with that in your plant? If you are experiencing trouble with oil deposits, oil deterioration, or oil foaming, you can benefit by changing to Stanoil. This multi-purpose industrial oil contains an oxidation inhibitor and an anti-foam additive that contribute to long oil life and clean, reliable operation of hydraulic units, speed reducers, and circulating systems.

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Oil Lubrication Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD

Ideal Indiana Offers You

Transportation



Yes... Indiana is Ideal For Transportation!

Whether you ship by rail, air, truck or water, Indiana can accommodate you.

● A network of 39 Railroads, operating over 7,000 miles of main line track serves industry in all parts of the State.

Eight major Airlines are available for freight, express and passenger service.

More than 300 Motor Freight Lines serve Indiana manufacturers using the state's 80,000 miles of improved and paid-for highways.

Shipping on the Ohio River, Great Lakes and the Chicago Sanitary and Ship Canal to the Mississippi makes Indiana's Transportation facilities one of the most adequate offered to industry by any state.

In addition to Transportation, Indiana offers adequate firm Power, good Labor, Raw Materials, an equitable Tax structure, an excellent Educational system, and ideal Recreation areas. If you are looking for a location for your business, investigate the many locations in Ideal Indiana.

Write ***today*** *for our booklet, "Industrial Facts About Indiana." Please give title and company name when writing.*

Indiana

DEPARTMENT of COMMERCE and PUBLIC RELATIONS
Department 602-IR · State House · Indianapolis, Indiana

gives it time to adsorb any odors. A brief swabbing removes stains and discolorations.

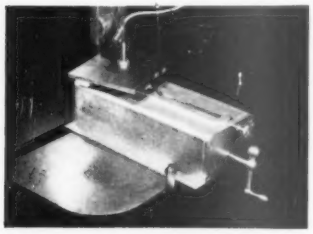
Hadco Corp., 2705 Detroit Ave., Cleveland.

Overhead Conveyor

Un-O-Veyor overhead conveyor features a chain consisting of links that connect to form a universal joint. The malleable iron link and universal joint is formed into one integral unit, with a clevis every 9 inches.

Each link has a set of two 2-in.-diam. hardened steel ball-bearing wheels. The load-carrying wheel is vertical, and the next link to it is made with its wheels horizontal to carry the thrust around corners.

Michna Systems, 5051 S. Western Ave., Chicago.



Bandsaw Fixture

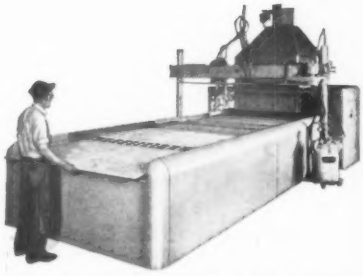
Automatic bandsaw attachment permits circle feed from 5 to 18 inches in diameter, and up to 2 inches in thickness. It will cut to within 1/64-in. tolerance, according to its maker. The feed is driven by a spring motor. Gears are enclosed to protect them against dirt and cuttings. The device runs for 5 minutes, stops automatically when the piece is cut.

Columbus Special Machine Co., Columbus, Ind.

Insulated Gloves

Hot 'N Cold gloves are made of red neoprene, with an insulating lining of several layers of wool fleece. They were developed for use where

Putting Air to Work... with Artistry!



This horizontal transverse automatic spray machine is a typical example of DeVilbiss engineering skill. It is capable of coating up to 9600 square feet of wall board every hour.

Artistry in the skillful use of air enables the trumpet player to produce beautiful harmonious tone patterns rather than blatant, discordant noise.

Artistry in the skillful use of air has enabled DeVilbiss to earn an enviable reputation as the world's foremost designer and producers of spray guns and spray finishing systems.

After 61 years of spray equipment manufacturing experience the name DeVilbiss is accepted to mean just one thing . . . *finest performance* . . . dependable performance that helps manufacturers improve product quality, save valuable man-hours, cut costs, produce for less and sell for less. When you want information on "how to spray it best at lowest cost" consult DeVilbiss.

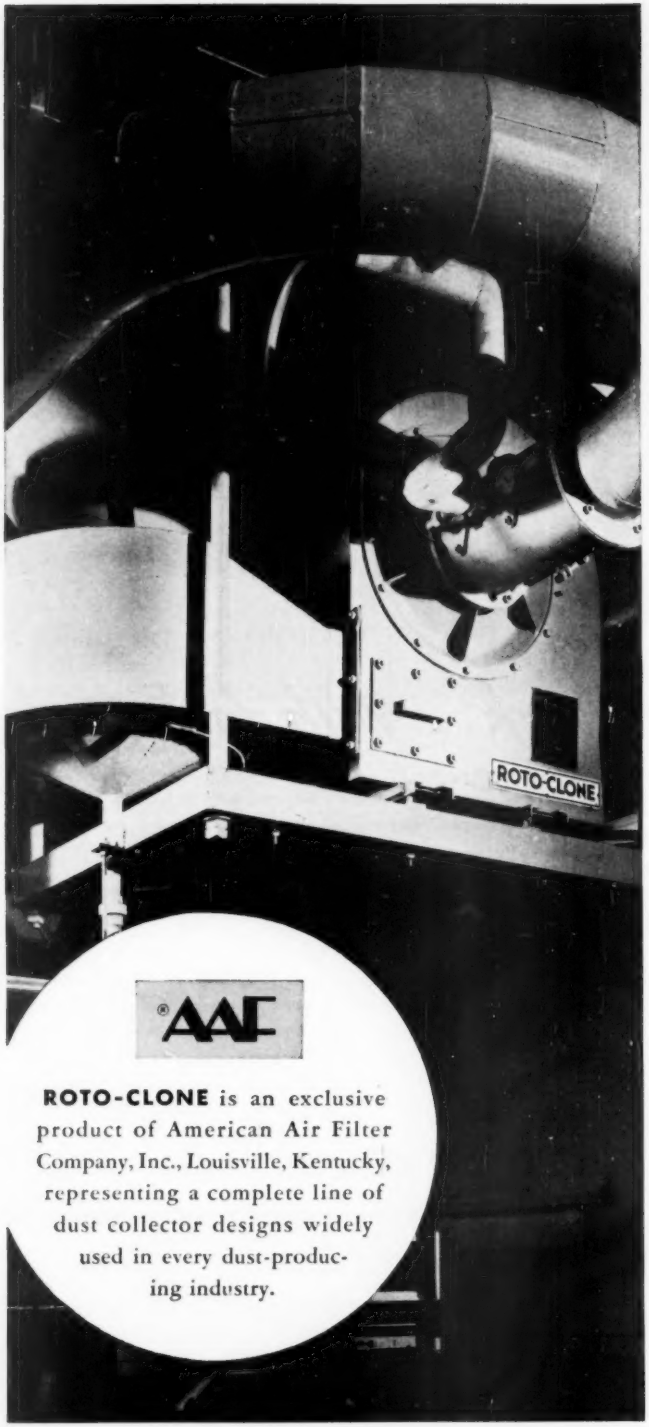
THE DEVILBISS COMPANY • Toledo 1, Ohio

Canadian Plant: WINDSOR, ONTARIO

DE VILBISS *means* **Quality** *in all four . .*

DV

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS



®AAF

ROTO-CLONE is an exclusive product of American Air Filter Company, Inc., Louisville, Kentucky, representing a complete line of dust collector designs widely used in every dust-producing industry.

a liquid-tight glove with resistance to extremely hot or cold temperatures is required.

They have curved fingers and wrist-length gauntlets. The maker says you can use them in temperatures as high as 314 deg. F. and as low as 85 deg. below zero.

The Pioneer Rubber Co., 1939 Tiffin Rd., Willard, O.

Dollies

"Little Giant" dollies are made of electrically welded heavy-gage steel. They have flat corrugations, ¾-in. wide, ¼-in. deep, all along the top to minimize load slippage. Their capacity is 750 pounds. They run on four 3-in. semi-steel swivel casters.

There are two models, both 13 inches wide and 4 inches high. Model 105 is 19⅜-in. long; Model 106, 22¾-in. long.

Monarch Metal Products, Inc., 724 S. Columbus Ave., Mt. Vernon, N. Y.

Transparent Oil Cups

These transparent oil cups show at all times just how much oil there is in the reservoir. They are made of clear, shatterproof plastic, with a large, self-closing, dustproof cap for filling and cleaning. They are made in 1-, 2-, 4-, and 8-oz. capacities, and you can install them wherever most convenient—on the outside of the housing, even on the other side of the wall, or around the corner of the room. They can be used on transmission and crankshaft cases, or wherever it is necessary to replenish oil in bearings.

Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12.

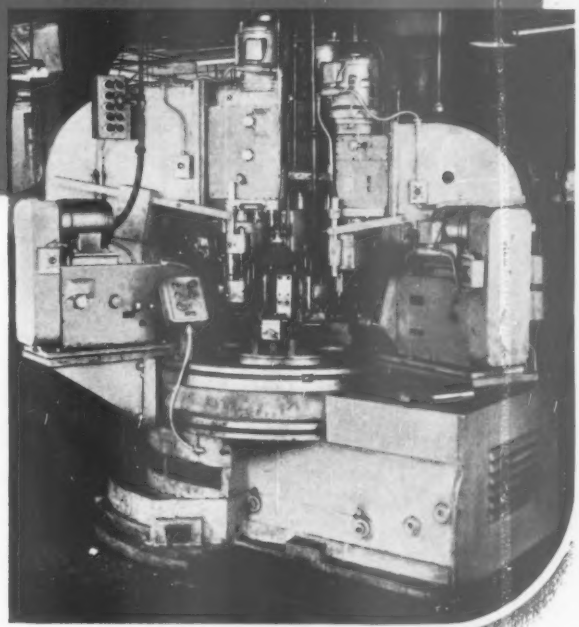
Small Steam Trap

Through the use of a double fulcrum point and venting mechanism, this steam trap will handle twice the condensate formerly possible, according to its maker. It is called the Duo-

From Century's Complete Line It Was Easy to Select

7 DIFFERENT Century MOTORS

to Drive This Automatic Drill Press



The automatic drill press shown here is equipped with the following standard Century motors:

1 — one horsepower 1735 RPM horizontal motor on a cross feed

1 — one horsepower 1735 RPM vertical motor on a vertical feed

2 — one horsepower 1155 RPM horizontal motors on cross feeds

1 — one and one-half HP 1155 RPM horizontal motor on cross feed

1 — one horsepower 3500 RPM vertical motor on vertical feed

1 — two HP 1740 RPM vertical motor on vertical feed

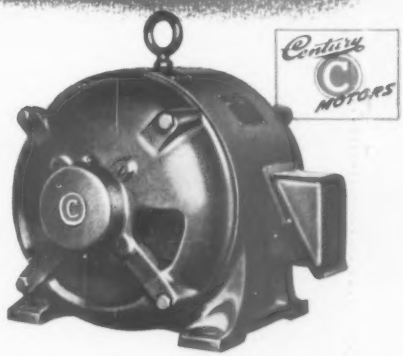
1 — two HP 1155 RPM horizontal motor rotating the circular table

The correct Century motor for your job supplies the *right* amount of power and starting torque at the right speed combined with the *right* frame mounting and right protection from surrounding atmospheres.

Century's wide range of types and kinds of electric motors in sizes from 1/6 to 400 horsepower can simplify complicated electric power problems.

Specify Century motors for all of your electric power requirements.

Popular types and standard ratings are generally available from factory and branch office stocks.



CENTURY ELECTRIC COMPANY
1806 Pine St. • Saint Louis 3, Missouri

-600

OFFICES AND STOCK POINTS IN PRINCIPAL CITIES

OUT OUR WAY

JOE IS LISTENING TO THE BIGGEST MISTAKE HE EVER MADE IN HIS LIFE/ JUST TO SAVE A FEW CENTS, HE TRIED TO GET ALONG WITHOUT SOL-SPEEDI-DRI ON THE SHOP FLOOR. SO LOOK WHAT HAPPENED/
ONE THING ABOUT JOE, HE LISTENS WELL TO HIS MISTAKES--SO WELL HE'LL NEVER TRY TO DO WITHOUT SOL-SPEEDI-DRI AGAIN/
NEVER AGAIN!
J.R.WILLIAMS
T. M. REG. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.

Don't take chances! Get the New Improved Sol-Speedi-Dri!

The new, Improved Sol-Speedi-Dri saves you money because you get more bulk, more coverage, more absorption, per pound. Sol-Speedi-Dri makes shop floors safe for working, safe for walking—cuts down on fire hazards—by soaking up all liquids—oil and grease included. Always be safe, be economical, with the new improved Sol-Speedi-Dri.

★

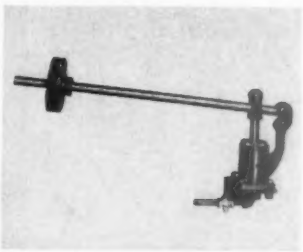
SPEEDI-DRI CORP., 1 Wall Street, New York 5, N.Y.

Warehouse stocks maintained in principal cities of the United States and Canada.

Inquirers in New York, New England and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa.

Step Leverage, and it was designed to give you a smaller trap for your drainage jobs.

The Clark Mfg. Co., 1830 E. 38th St., Cleveland 14, O.

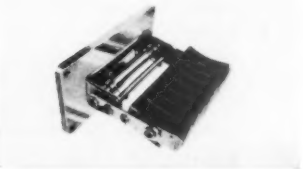


Weight-Loaded Lubricator

You can use weights of different values and adjust them to apply pressures up to 150 pounds per square inch or more with this lubricator. It is designed to deliver greases and oils at constant pressure in any desired quantity. Typical uses are application of lubricant to stuffing boxes of pumps and mixers, motors and engines, heavy machinery, line shafting bearings, and motorized and lubricated valves.

Because the position of the lubricator arm shows exactly how much lubricant is in the cup, you can always see when the supply is running low. The 7½-oz. grease cup has a conical bottom to speed the passage of the lubricant.

Mixing Equipment Co., 1024 Garson Ave., Rochester 9, N. Y.



Lubricator for Overhead Cranes

The Felpax lubricator consists of nonglazing felt wicks held in place with the correct pressure on the axle to provide constant lubrication to bearings and thrust flanges. It comes as a complete unit, ready to fit into the journal box. The wicks are factory-filled with oil and sealed in an oilproof container. The maker says the only service required is periodic checking and filling of the oil reservoir.

Miller-Felpax Corp., Dept. I, Winona, Minn.

Cable Load-Limit Switch

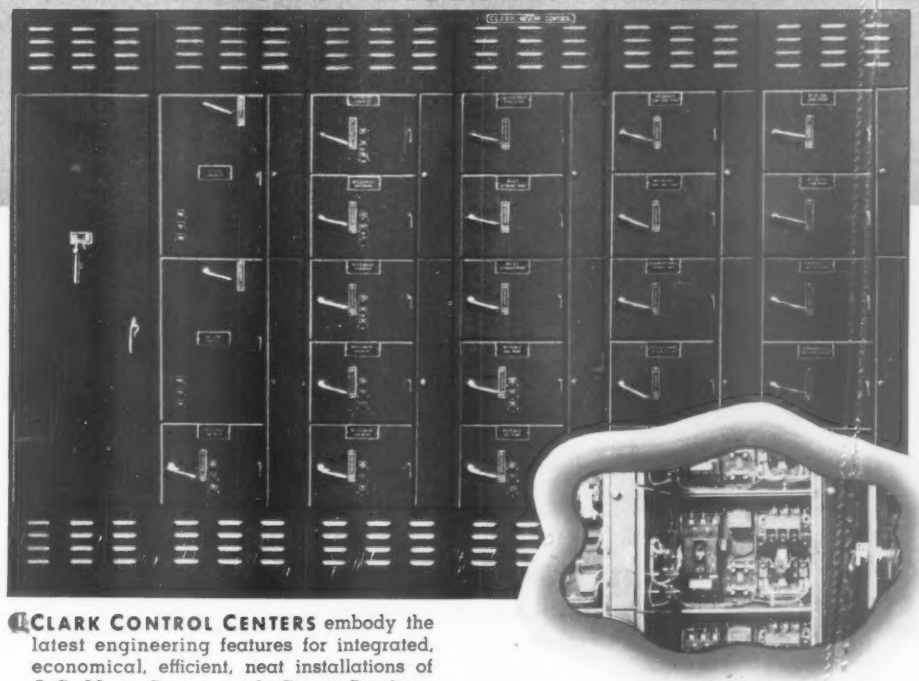
Load-limit switch is designed to operate an electric switch when the cable tension reaches a predetermined value. You can use it on wire cable from ¼- to ¾-in. diameter without cutting or removing the cable, claims its maker.

To use it, clamp an alloy steel heat-

Presenting . . .

CLARK CONTROL CENTERS

New! Modern! Efficient!



CLARK CONTROL CENTERS embody the latest engineering features for integrated, economical, efficient, neat installations of A.C. Motor Starters with Circuit Breakers, or Fusible Disconnect.

Each section is 90" high, 24" wide, and 20" deep, and all sections can be arranged in any angular pattern to meet floor space requirements. Additions to existing installations are easily made.

The 24" width has the definite advantage of supplying liberal wiring space for all units. For starters up to and including Size 3, a 6" wiring trough with hinged door is provided.

Units are 13" high, or a multiple thereof. Each section accommodates any combination of starters (Sizes 1 through 5) totalling 65" in height. Rearrangements are easily made at any time.

Close-up view of Size 2 Starter and Circuit Breaker.

Louvres, top and bottom, provide adequate ventilation, and avoid accumulative heating.

Units are "plug-in" type, easily removed.

Load and control leads, and horizontal line bus can be placed in either the top or bottom and can be interchanged.

The control equipment and wiring troughs are accessible from the front, by simply opening a door.

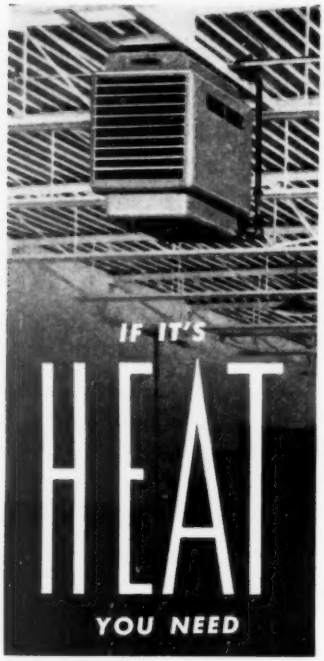
Vertical sections are mounted on a common floor channel for rigidity and perfect alignment.

For full details ask for Bulletin 6200

ENGINEERED ELECTRICAL CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152ND STREET, CLEVELAND 10, OHIO

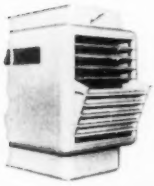


YOU'LL SAVE WITH A

Humphrey

GAS UNIT HEATER

Complete heating plants in themselves, Humphrey Gas Unit Heaters save in many ways. They require no steam or water lines; no fuel storage; no boiler equipment; no fireman. Heat is generated within the unit and forced to every corner of the room.



View at left shows unit heater with louvers adjusted to direct the heated air downward.

Made in convenient sizes to meet every heating need. Smartly styled. Write for literature and prices.

GENERAL GAS LIGHT CO.
KALAMAZOO, MICHIGAN

treated rectangular beam on the cable. Then put an offset in the cable to deflect the beam, so that the loading will operate the switch. An adjusting screw is provided to set the switch at any predetermined load; an auxiliary stud seals the switch when used as a limiting device by safety or crane engineers.

The single-pole double-throw switch can be used with closed contacts connected in series with a holding coil of the hoist motor magnetic starter. Or the open contacts can be connected to close an alarm circuit when the load limit has been reached. Other variations are also possible, depending upon the job to be done. Load setting can be anywhere from 500 to 25,000 pounds single-line pull.

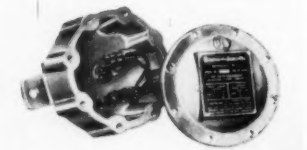
Martin-Decker Corp., 3431 Cherry Ave., Long Beach 7, Calif.

Flexible-Shaft Portable Power Units

Two portable power units, the Jiffy Tool and the Speed Jiffy, can be used for polishing, routing, brushing, grinding, buffing, drilling, filing, sanding, and other jobs. The first is a 3-caster floor model, delivering ¼ hp. at 1750 rpm. through a 5-in. flexible shaft. The motor operates on any 110-volt, 60-cycle, single-phase a.c. line. Both 1/3- and ½-hp. units are also available.

The second tool is for more complex operations. It has three speed variations—1000, 1750, and 3000 rpm.—obtained merely by altering the plug-in position of the flexible drive shaft.

Stow Mfg. Co., Binghampton, N. Y.



Explosion-Proof Switch Box

For use in hazardous locations, this explosion-proof switch box is designed to accommodate mercury

NOW for a better fit, more comfort, longer wear

NEW, IMPROVED

NEOPRENE HOOD INDUSTRIAL

CURVED-FINGER GLOVES!

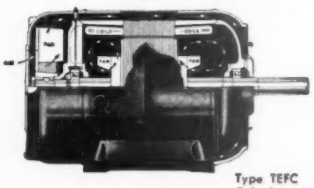
New Hood gauntlets and knit wrists provide new *comfort*, better *fit*, longer *wear* for *vital* hands. In addition, there's ample knuckle allowance, curved fingers and thumbs, reinforced thumb crotch, no seams on working surface, *color fast* knit wrists. Be sure of new protection, new efficiency. Order from your jobber today!

HOOD for Safety plus

HOOD RUBBER CO.
Watertown, Mass.
DIVISION OF THE B. F. GOODRICH CO.

THE LATEST DEVELOPMENT in AIR COOLED Ball Bearing MOTORS

Totally Enclosed Fan Cooled



Type TEFC Polyphase

Totally enclosed, constant speed, continuous duty—designed for cooler and more economical operation under extreme heat and dust. Fully ball bearing quiet running.

WRITE FOR DESCRIPTIVE LITERATURE

VALLEY
ELECTRIC CORPORATION
4221 FOREST PARK BLVD. - ST. LOUIS 8, MO

Enduro-TURNS IDEAS INTO REALITY!

WASHING MACHINE TUBS OR 500-GALLON KETTLES. Using 40¾" circular blanks of ENDURO Stainless Steel, the 300-ton hydraulic press below forms 21½" inside diameter washing machine tubs in a single 15¾" draw. When the product is too large for drawing—as in a 500-gallon kettle—you can weld formed sections together easily and soundly.

THERE'S SO MUCH YOU CAN DO WITH IT ...AND SO MANY THINGS THAT IT DOES WELL!

Whether you consider it from design or actual production viewpoints, Republic ENDURO Stainless Steel is a most versatile material.

You can fabricate it by every modern method—to practically any desired shape. You can stamp, draw, roll, spin, machine, forge, cast, weld, solder, rivet and otherwise work it. Although certain simple precautions must be taken, you can employ the same equipment used for carbon steels.

On the other hand, there are so many things that ENDURO does well. It greatly simplifies the age-old problem of rust, corrosion and oxidation. Its inherent high strength permits weight saving through the use of thinner sections. It maintains its strength at high or low temperatures. It does not contaminate metallically. It is remarkably easy to clean. Its distinctive beauty encourages unusual decorative treatments. Best of all, it usually costs less in the end.

There are many types of ENDURO—each with specific qualities to do certain tasks well. There is a wide variety of finishes and physical forms to meet all needs. There is literature on ENDURO to help you use and fabricate it to best advantage. Write us.

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, N. Y.

Enduro **STAINLESS STEEL**

REG. U. S. PAT. OFF.

REPUBLIC STEEL

✓ **Check ALL 12 advantages:** • RUST AND CORROSION-RESISTANCE • HEAT-RESISTANCE • HIGH MELTING POINT • LOW COEFFICIENT OF EXPANSION • HIGH STRENGTH • GOOD DIMENSIONAL STABILITY • NO METALLIC CONTAMINATION • EASY TO CLEAN • EASY TO FABRICATE • EYE APPEAL • LONG LIFE • LOW END COST

"Sure, I'd wear a respirator . . .

. . . if it was comfortable!"

Respirator Style 45D

Respirators must fit properly and provide ease of breathing before workers stop risking their lungs—and your profits.

Protection must be combined with comfort. One without the other means a wasted investment in safety equipment. Here is a WILLSON lightweight respirator, approved by the U. S. Bureau of Mines for use in dusts and mists. It has gained wide acceptance in industry through workers' willingness to wear it. Normal breathing is assured through easily replaceable filters and a positive acting exhaust valve. The facepiece, in two sizes with adjustable wire nose spring and adjustable elastic headband, is adaptable to all face sizes.

NEW CATALOG

In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!

WILLSON

"Established 1870"

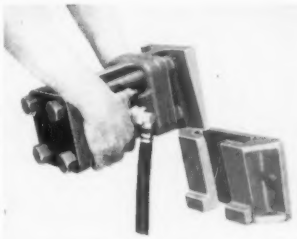
WILLSON PRODUCTS, INC., 219 WASHINGTON STREET, READING, PENNA.

tubes to make and break electric circuits. Called Fig. ST-5500, you can use it in ambient temperatures up to 155-deg. F.

The body and cover of the switch are cast aluminum. The body has sturdy mounting flanges, and measures about 9½x5¼ inches. A threaded hub accommodates a stainless steel operating shaft on which are mounted the two mercury tube electrodes. The tubes are actuated by a tilting motion of this shaft, and are connected to an internal terminal block by individual flexible wire leads. You can reach all terminal connections by lifting off the cover. A ½-in. threaded outlet is also provided for conduit connection.

This switch may be used to turn on lights, sound horns, or set off alarm systems from a remote location. And it will permit transmission of signals from points where an open switch cannot be used, such as in areas contaminated with flammable or explosive vapors.

Shand & Jurs Co., Berkeley, Calif.



Pneumatic Vibrator

LSRR vibrator assembly incorporates cast-steel male and female wedge-type mounting brackets for attachment to hopper railroad cars. They are intended for use in the unloading of bulk materials, but you can also use them on bins, chutes, flasks, or special hoppers. Female brackets can be attached with bolts or by welding, and you can move the vibrator from one installation to another to eliminate clogging and speed material flow.

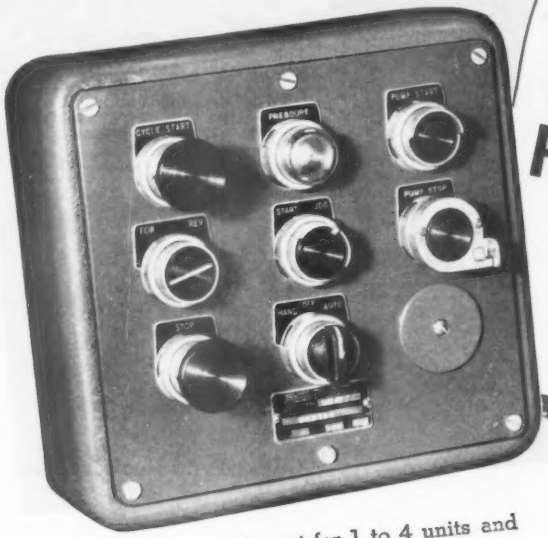
The Cleveland Vibrator Co., 2732 Clinton Ave., Cleveland 13.
48.

Casters

The maker claims that in making this line of "cold-forged" casters, tremendous pressure was used to move metal to points of greatest wear, resulting in smooth, highly

Complete Line of MACHINE TOOL PUSH BUTTONS

- OIL-TIGHT
- STURDY
- COMPACT
- FLEXIBLE



ENCLOSURES are die-cast for 1 to 4 units and cast aluminum for 3 to 16 units.

UNITS from which stations are assembled have these important advantages—

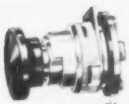
- Proven oil-tight and coolant-tight by severe tests involving millions of operations.
- All-metal push button operators can take terrific abuse.
- Much more compact, they require substantially less panel and back-of-panel space than previous designs.
- Extra flexibility. A virtually unlimited number of combinations can be obtained from standard units.

Write for Bulletin 9001 Type T. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wis.

New Pilot Light has Important Features

Wide angle visibility—Unusual brilliance—Integral transformer—Six-volt lamp filament withstands shock and vibration which frequently cause failures of higher voltage filaments—Bayonet-type socket prevents lamp loosening under severe shock or vibration.

Red and Black Standard Push Buttons


Red and Black Mushroom Push Buttons

Selector Push Buttons

2 and 3 Position Selector Switches

5 Kinds of Contact Blocks

Maximum Flexibility with Minimum Stock because . . .

ANY of these Square D Operators can be used with ANY ONE of five Square D 2 and 4 Circuit Contact Blocks

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

what every good secretary knows... about her boss

As a *good* secretary you know it isn't the regular assignments that make a hit with the boss, but rather the little thoughtful things.

Now . . . there isn't anything that is of more importance to management than profits . . . and profits depend much upon reduced costs. And that's where you come in—and where we come in.

General Boxes reduce costs; furthermore, they provide protection. Hundreds of firms know this, but perhaps your firm doesn't.

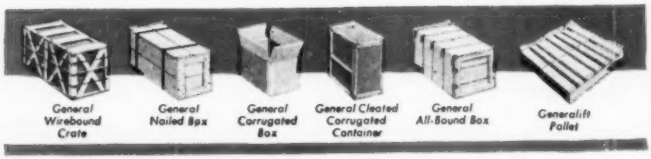
Why not drop your boss a memo? He'll be glad you did . . . and it will be added proof that you ARE a good secretary.

memo
Note that General Box Company is cutting packing and shipping costs for many firms — Seems like we should check on this — huh? Mary

General BOX COMPANY
★★★★★
...engineered shipping containers

GENERAL OFFICES: 504 N. Dearborn St., Chicago 10.
DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez.
Continental Box Company, Inc.: Houston, Dallas.

Send for your free copy of "THE GENERAL BOX"



polished ball-race finish closely resembling a ground surface. The contours of the raceway fit the ball closely to permit free swiveling action. A dust cap keeps out dirt and provides a means for lubrication.

Called Series 40, the casters are made in five wheel-types, in 3-, 4-, 5-, or 6-in. diameters. Load capacities, which vary with type of wheels, range from 175 to 650 pounds. They may be equipped with thread guards if desired.

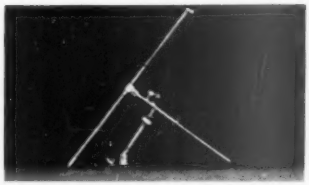
The Rapids Standard Co., Inc., Grand Rapids, Mich.

Disk-Type Electric Brake

This brake was developed to provide controlled, fast, smooth-cushioned stops on electric motor applications. It is a combination magnet and friction type, electrically operated. It requires only 25-35 watts of direct current, and may be mounted on any standard NEMA "C" flange, and on motor frame sizes 203 through 365.

Action starts when the current is applied. The brake utilizes the power of electro-magnetic attraction between its ring-shaped electro-magnet and armature disc, as well as ordinary friction. Because the applied power varies with the flow of current through the magnet, the maker claims that the brake offers a wide range of application, with the action controlled either manually or automatically. Rectified power can be obtained from 110-, 220-, or 440-volt a.c. by using a conversion unit.

Warner Electric Brake Co., Beloit, Wis.



Pattern-Making Instrument

Here is a device designed to help the average sheet-metal worker or welder solve pattern problems without having to use the drafting board. It marks out cutting openings and other joining lines required to fit round, square, tapered, straight, or odd-shaped ducts into round or other-shaped objects, on flat, curved, or many-angled sides, on or off center, and at any angle.

Called the SMW pattern maker,

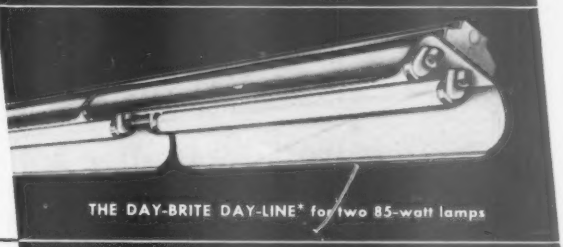
THIS db FIXTURE
CARRIES THE DAY-BRITE RLM LABEL

Engineered and manufactured to meet rigid RLM standards, this DAY-LINE fixture is typical of all Day-Brite "Decidedly Better" industrials.

THE DAY-BRITE DAY-LINE* for two 40-watt lamps with TURRET* Sockets

THIS db FIXTURE
CARRIES THE DAY-BRITE RLM LABEL

DAY-LINE steel reflectors are finished in vitreous porcelain enamel. Reflection factor is 82% or more. Lateral shielding angle is 13°.



THE DAY-BRITE DAY-LINE* for two 85-watt lamps

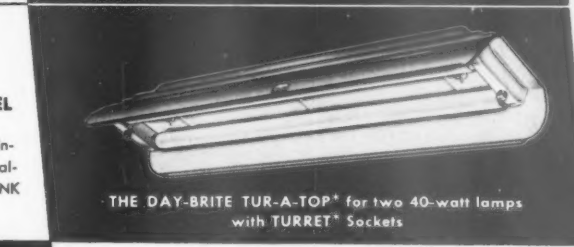
THIS db FIXTURE
CARRIES THE DAY-BRITE RLM LABEL

The sturdy TUR-A-TOP housing is die-drawn from one piece of steel eliminating mis-alignment and assuring a lifetime of stability.

THE DAY-BRITE TUR-A-TOP* for two 85-watt lamps

THIS db FIXTURE
CARRIES THE DAY-BRITE RLM LABEL

This TUR-A-TOP, like all Day-Brite industrials, is wired with Certified ballasts and is equipped with NO-BLINK type starters.



THE DAY-BRITE TUR-A-TOP* for two 40-watt lamps with TURRET* Sockets

409

In fact, every Day-Brite industrial fixture bears this positive proof of top quality and engineering . . .

DAY-BRITE RLM

The point is this . . . if it's a Day-Brite industrial, it's a RLM fixture. Those two labels—Day-Brite and RLM—are your *guarantee* of year-in, year-out top performance at the lowest possible installation and operating cost. Before you plan your factory, plant or warehouse lighting, get the facts about "Decidedly Better" Day-Brite. Write TODAY for bulletins 30-A-3 and 30-B.

IT'S EASY TO SEE WHEN IT'S
DAY-BRITE *Lighting*

*T. M. Reg. U. S. Pat. Off.

Day-Brite Lighting, Inc., 5441 Bulwer Ave., St. Louis 7, Mo.
In Canada: Amalgamated Elec. Corp., Ltd., Toronto 6, Ontario

DISTRIBUTED NATIONALLY THROUGH LEADING ELECTRICAL WHOLESALERS

CHESTER HOISTS
Save Money

For rapid lifting and lowering with utmost economy, specify *Chester Spur Geared Chain Hoists.*

Expertly designed and built by the Hoist Division of The National Screw & Manufacturing Company, they are strong, safe and dependable. *Timken Bearings* reduce friction on all working parts, insuring smooth operation and long life. Retaining brake holds the load at any position.

Chester Hoists are furnished in many types, such as Extended Hand Wheel, Twin Hook and close headroom types, e.g., Army, Clevis Connected, etc. Sizes from ¼ ton to 25 tons.

CHESTER DIFFERENTIAL HOISTS are designed for use where occasional lifting is required at a minimum expense. Made in ¼, ½, 1 and 1½-ton sizes, these lower priced hoists are light and portable, hold their load at any point and will not self-lower.

CHESTER TROLLEYS are furnished in either plain or geared type, with either Timken Roller or plain bearings. They are well balanced and give excellent service.

Send Coupon or Write for Our New Catalog

THE NATIONAL SCREW & MFG. CO.

Chester Hoist Division • **Lisbon, Ohio**

The National Screw & Mfg. Co., Chester Hoist Div., Lisbon, Ohio

Please send copy of your new catalog on Chester Hoists and Trolleys.

Name _____

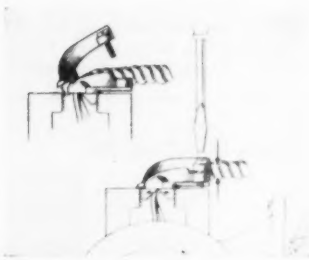
Company _____

Address _____

F-6-9

it is a modified parallel-leg compass with an adjustable radius bar. The scribe-leg slides in a bearing on the radius bar to project the desired shapes onto any surface. As a projecting instrument, it is universal.

E. A. Scott, 45 W. 45th St., New York.

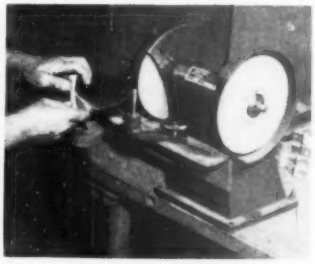


Threaded Angle Connector for BX Cable

Threaded-type 90-deg. connector for ⅜-in. armored cable is made of aluminum die-cast alloy. It is similar in design to the previous models made for ⅞-in. knock-out openings, with a cam-wedge principle employed to provide positive grounding and positioning, even when subjected to severe vibration.

Called Model 238T, these connectors may be installed after the wiring is completed. You don't have to screw in the completed part first. The connector is made with three parallel ridges or serrations on the lip of each of two parts. These match standard ½-in. I.P.S. female threads in switch boxes, motor housings, and the like. By tightening two machine screws joining the two parts, the serrations engage the threads for a firm connection. As you pull up the screws, the cam-wedge action increases the pressure against the the threads.

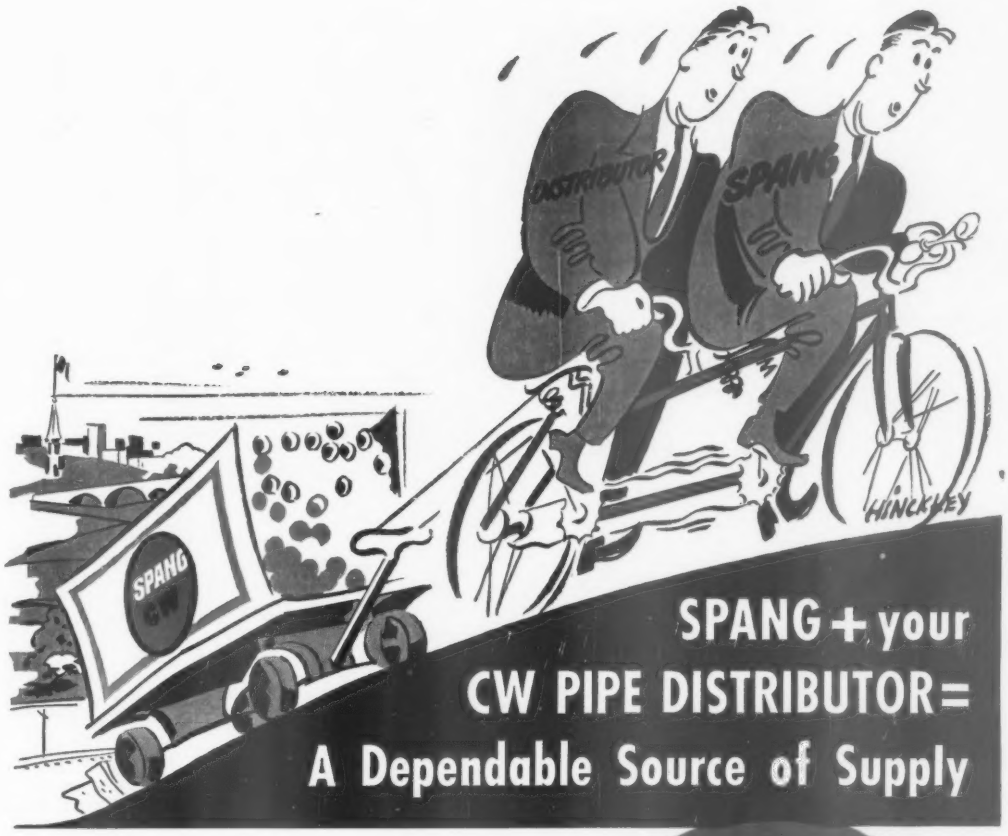
The Unimatic Corp., 52 E. Centre St., Nutley, N. J.



Circular Saw Grinder

You can sharpen, joint, or gum dado heads and circular saws from 5 to 30 inches in diameter with this grinder. Its fixed wheel and hori- Reynolds circular saw grinder. Its fixed wheel and horizontal saw holder leave both hands free. A self-centering tapered cone fits into the saw's center hole, holds it firmly in place.

Locking handwheel on the underside of the swivel arm adjusts for



SPANG + your CW PIPE DISTRIBUTOR = A Dependable Source of Supply

It takes real team work to establish a dependable source of supply . . . like the cooperation that exists between Spang and your CW Pipe Distributor. They pour everything into a united effort to give you the products and service you want.

Your Spang CW Distributor has built a streamlined organization to provide you with top-notch service on all the things he has for sale. While here at Spang we have streamlined our mill to protect and maintain the *quality* that has made Spang CW Pipe famous for over 100 years.

When you need pipe, fittings, fixtures, valves or other piping materials, contact your Spang Distributor first . . . *he's a dependable source of supply.*

SPANG-CHALFANT

Division of The National Supply Company

GENERAL SALES OFFICES: PITTSBURGH, PA.

District Sales Offices: Atlanta; Boston; Chicago; Detroit; Houston; Los Angeles; New York; Philadelphia; Pittsburgh; St. Louis; San Francisco

SPANG CW

QUALITY *that is recognized wherever pipe is used*

it's TOPS in its class

Fig. 2140
GLOBE
125 lb. S.P.
200 lb. W.O.G.

125 lb. S. P. BRONZE GLOBE, ANGLE and CHECK VALVES
Built to LUNKENHEIMER QUALITY STANDARDS

Want a lower pressure valve to give the same dependable, low-cost service you get in higher pressure LUNKENHEIMER Valves?

Here it is — New Fig. 2140 Globe; Fig. 2141 Angle; Fig. 2142 Lift Check; Fig. 2144 Swing Check. These valves feature Lunkenheimer's traditionally fine design and sturdy construction, plus exclusive silicon bronze alloy stems which eliminate stem thread failure due to wear.

Whatever your requirements for lower pressure service, you'll find these new valves unequalled for dependability and true economy.

Your LUNKENHEIMER DISTRIBUTOR is stocking these new 125 lb. S.P. Bronze Valves. Call upon him for your original equipment, replacement and repair valve requirements. Ask him for Circular No. 582 or write direct.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI 14, OHIO, U. S. A.
NEW YORK 13 CHICAGO 6
BOSTON 10 PHILADELPHIA 34
EXPORT DEPT. 318-322 HUDSON ST. NEW YORK 13, N. Y.

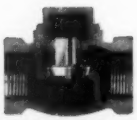


Fig. 2142 LIFT CHECK
125 lb. S.P. 200 lb. W.O.G.

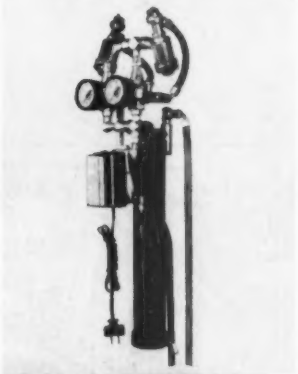
Nowhere in the line is dependability more important than in Check Valves. These Checks function quickly and positively, seat accurately and tightly.

Fig. 2144 SWING CHECK
125 lb. S.P. 200 lb. W.O.G.

grinding any shape of tooth, and you can regulate the depth gage for uniform cuts. The bedplate is also adjustable to accommodate various thicknesses of blades or dado heads.

The grinder has two wheel holders, and you can put a wire brush on one side to remove rust, pitch, or stains. Two 8-in. wheels are supplied, ¼ and ⅜ in. in thickness.

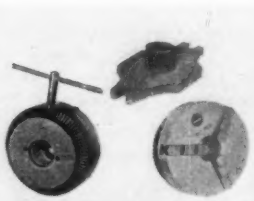
Providence Saw & Knife Co., 303 Eddy St., Providence, R. I.



Humidifying Units

Line of humidifying units is made for atomization of water, chemicals, or insecticides. Units are available in three sizes, to diffuse up to one, two, and three gallons per hour. The maker says that these capacities are sufficient to control humidity within 2% of fluctuation in areas of 15,000, 30,000, or 45,000 cubic feet of space. The required air pressure is six cubic feet per minute at 40 pounds, which can be supplied by any suitable air compressor.

Paasche Airbrush Co., 1909 Diversey Pkwy., Chicago 14.



Chuck With Rotating Geared Scroll

Here is a 3-jaw universal chuck said to combine the speed of a lever-operated chuck with the powerful grip of one that is pinion-operated. You can quickly lock your work in place by inserting the end of a wrench stem into any one of six holes in the outside diameter of the scroll, then rotating the scroll rapidly by lever action. To secure a final tight grip of the jaws, you slip the end of the wrench stem into any of

***WRIGHT EQUIPMENT** is used in many new buildings at Caterpillar Tractor Co., Peoria, Illinois. Shown here are 3 of 10 Wright Speedway No. 2 Frame Electric Hoists on one of "Caterpillar's" scraper assembly lines.*

WRIGHT

We like to do business

with the type of buyer who's "from Missouri"—who makes his own performance tests on the job—whose idea of value is based solidly on such tests.

Send for your copy of the descriptive folder DH-65. Your nearby Wright Distributor or Wright District Office can supply you. Or write direct to us in York, Pa.

ACCO

York, Pa. · Chicago · Denver · Detroit · Los Angeles · New York
Philadelphia · Pittsburgh · Portland · San Francisco · Bridgeport, Conn.

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

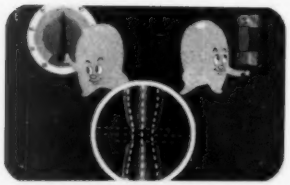
HOISTS TROLLEYS CRANES

TRADE MARK

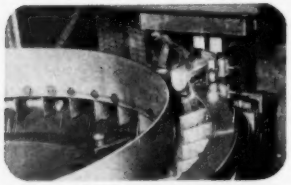
In Canada: UPTON, BRADEEN & JAMES LTD., Montreal, Toronto, Vancouver, Windsor, Winnipeg

Can Resistance Welding Cut YOUR ASSEMBLY COSTS?

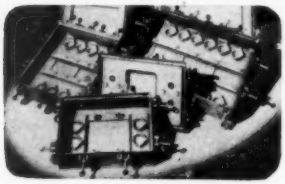
See this film and find out!



1. "THIS IS RESISTANCE WELDING", a full-color sound motion picture prepared by General Electric, will appeal to management, engineers, and shop men. Filmed with the layman in mind, this picture makes liberal use of cartoons (above) to simplify . . .



2 . . . the more technical aspects of resistance welding. Principal objective of the film, though, is to explain how resistance welding cuts fabricating and assembly costs. One application shown is the assembly of a blower rotor (above) where clearances . . .



3 . . . had always been a problem. Resistance welding cut manufacturing time by 75%! Another big saving dramatized in the film is the case of the switch boxes (above). These were formerly sand cast with holes individually located, drilled and tapped.

4. These are now completely welded on a continuous basis and production is up from a few hundred to 1000 units a day! The audience is also shown how another manufacturer welded studs on a steel cubicle framework (above) in one operation . . .

5 . . . instead of the seven formerly required! And for the cost-conscious executive, there's the story about the railroad that used resistance welding to save expensive seamless tubing (above). To give you a "preview" of this worthwhile film let us send you this . . .

6. RESISTANCE WELDING MANUAL . . . **FREE!** It's jam-packed with the kind of information on resistance welding you want. [Complete program consists of full-color 16mm film, manual, "highlights" booklets.] MAIL THE COUPON TODAY!

FREE
to business management!

General Electric Co., Section D684-14
Schenectady 5, N. Y.

Attach to your business letterhead

☐ Please send me a complimentary copy of the G-E Resistance Welding Manual (GES-3393). (Extra copies at regular manual price—$1.00.)

☐ I'd like to borrow a 16mm print of the film from your nearest film library.

Name _____ Title _____

Company _____

Street _____

City _____ State _____

GENERAL ELECTRIC

the six additional holes adjacent to the scroll so that the pinion in the wrench engages with the bevel gear teeth at the back of the scroll. A slight turn of the wrench rotates the scroll and locks the jaws.

Called Westcott 75, this chuck has solid reversible jaws. It is threaded for direct attachment to 1½-in. 8-thread lathe spindles, or you can use it on a milling machine dividing head. By attaching it to a threaded mounting plate, you can bolt it to the table of a drill press, milling machine, or to the work bench, for use as a vise or machining fixture.

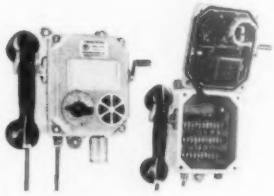
Westcott Chuck Co., Oneida, N. Y.

Right-Angle Drive Unit

Designated RA-2, right-angle drive unit has spiral bevel gears, case hardened, and matched and lapped in pairs after hardening. Both input and output shafts are 1¼ in. in diameter and are mounted in precision tapered roller bearings. All shaft extensions have dirt- and moisture-repelling oil seals. The output shaft may extend to the right or left, or you can get an optional through-shaft to provide extensions to both right and left.

Capacity of these units is from 6 to 12 hp., depending on the ratio. Standard ratios are 1:1, 2:1, 3:1, 3:2, and 4:3. Other sizes are available on order.

Ohio Gear Co., 1300 E. 179th St., Cleveland.



Sound-Powered Telephones

These telephone stations operate without batteries or any outside power for either talking or ringing circuits. All operating parts are mounted on the cover, which you can lift off to leave the case free for installation of the interstation wiring system.

Each station consists of a handset mounted on the aluminum case which contains a 1200-cycle magneto generator, a howler unit with con-

Inert Gas Welding with P&H

High-Frequency AC Arc Welders is Better, Faster, and Costs Less

P&H High-Frequency AC Welder Features

- Welds aluminum, stainless steel, magnesium—any hard-to-weld metals.
- Requires no filler metal—no flux, thus no slag.
- No grinding of welds necessary.
- Stable arc.
- Compact design requires little or no floor space.
- No moving parts to cause trouble, delay, or maintenance expense.

1. Dial-lectric control does away with moving coils, cores, sprockets, worms, chains, and levers—for lower maintenance cost and easier operation.

2. Unique high-frequency voltage control brings high frequency into phase easily and quickly — for better cleaning action, faster welding.

3. Rugged construction maintains desired frequency — for smooth, stable performance.

4. P&H's exclusive built-in Dial-lectric remote arc-control feature automatically saves you approximately $100.00.

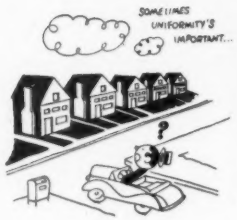
For best results on inert-gas welding, use P&H high-frequency AC machines. These outstanding welders are available in 150, 200, and 300-amp sizes. Get full details from your P&H representative, or write us for latest literature.

P&H **ARC WELDERS**
4525 W. National Avenue
Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-Assembled Homes

How to keep costs down with OZALID



Your Ozalid operation *should* be the simplest, most inexpensive business system in your organization.

If it isn't, check these two factors:

1. Always use Ozalid sensitized materials in your Ozalid machine. Month after month, package after package, Ozalid materials are *uniform.* Printing speed, fade-resistance, physical strength, density, and eleven other characteristics are kept in scrupulous balance so that one batch of paper gives you the same results as the last one... or the next one!

Thus your Ozalid operator's time is spent in printing—not in studying the characteristics of vastly differing diazo materials.

2. Ozalid's nationwide service organization is as near as your telephone book. Let these trained technicians and business wizards keep your Ozalid operation in tiptop form. They'll keep your Ozalid machine in super-efficient working condition, as well as help you set up new methods of getting more work done with less effort... through Ozalid!

If you have an Ozalid machine, are using Ozalid materials and taking advantage of the national Ozalid service organization... *you're saving time and money!*

If you do not have an Ozalid machine, it's time you found out how error-proof Ozalid duplicates anything typed, drawn, written, or printed (on translucent paper) in seconds! Write today. Or look up your Ozalid distributor in the classified book and call him!

Don't copy... use

OZALID!

Ozalid, Johnson City, N. Y.
Dept. 135

A Division of General Aniline and Film Corporation

"From Research to Reality"

necting horn for signaling, and terminal blocks. If selective ringing is desired, a rotary selector switch is included.

Common-talking selective-ringing systems up to 24 stations, or an unlimited number of common-talking, common-ringing stations can be used on each system. And the maker says that the systems operate up to thirty miles.

U. S. Instrument Corp., 409 Broad St., Summit, N. J.

Nonslip Aluminum Floor Plate

Here is a heavy-gage aluminum floor plate with a nonslip safety tread of silica-carbide grit material distributed through the casting. It is suitable for use as stair plates, fire escape landings, building entrances, and garage ramps—any place where a nonskid surface is needed.

You can get it in various sizes up to six feet long and one foot wide, thicknesses of ¼, 5/16, or ⅜ inch. Countersinks for screws or bolts or other special mounting arrangements may be included in the mold.

Mold-Cast Alloy Corp., 2140-A Montcalm St., Indianapolis, Ind.

Change in Name

The Powermatic Ventilator Company of Cleveland, makers of Iron Lung roof ventilators, intake units, and similar items, has changed its name, but will remain at the same address. It is now:

Iron Lung Ventilator Co., 4019 Prospect Ave., Cleveland 3.

Crane

Five-ton front-boom crane has four speeds forward, up to 14 mph., and one speed in reverse. An auxiliary reverse transmission is available to provide all the forward speeds for traveling in reverse.

Front-wheel drive is said to provide full traction under all conditions, with or without load. The crane is equipped with pneumatic

PLENTY of POWER...

for hardest drilling, day after day...

SKIL Drills

It takes tough drills to handle tough drilling jobs! It takes SKIL Drills! They're built for day-in day-out punishment. They have the power, the handling ease, the drilling speed to make every job easier, faster and better. Ask your SKIL Tool Distributor to show you how SKIL Drills will solve your drilling problems. 26 models to fit your needs . . . to save your time and money.

SKILSAW, INC.
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD.
66 Portland St., Toronto, Ont.

ELECTRIC **SKIL Tools** PNEUMATIC
TRADE-MARK

SKIL Tools are made only by Skilsaw, Inc.

Features Like This Make SKIL Drills Right for You!

Powerful, Universal Motors—Balanced, dynamically and statically for smoothest, most dependable operation.

Helical Cut Gears—Precision cut for quiet running and long life.

Bearings—Top quality bearings minimize friction, eliminate vibration.

Aluminum Alloy Body—High-strength, die-cast housings give greater sturdiness and accuracy in fit.

Perfect Balance—Compactness and perfect balance in every SKIL Drill provide maximum handling ease in all drilling positions.

MAKE SAVINGS WITH

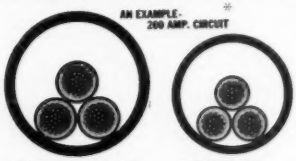
CRESCENT

ENDURITE-Type RH

Gives Greater Current Carrying Capacity per Dollar of Installed Cost

AN EXAMPLE-
200 AMP. CIRCUIT

Requires 2½" Conduit. Maximum permissible operating temperature 60°C.



Requires 2" Conduit. Maximum permissible operating temperature 75°C.

250,000 CM TYPE R 3/0 TYPE RH

The superior heat resistant characteristics of CRESCENT ENDURITE INSULATION with its higher permissible operating temperature and therefore greater current carrying capacity, permit the use of a smaller size of conductor, and in most cases smaller size of conduit at less cost than would be required for Type R Wire for the same load.

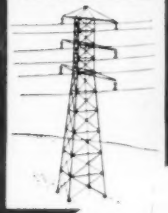
For light loads requiring small sized conductors, Voltage Drop is the determining factor in choice of wire size. Usually in sizes No. 6 AWG and heavier for power circuits or No. 1 AWG and heavier for lighting circuits, CRESCENT ENDURITE TYPE RH Wire & Cable gives the lowest installed cost-per-ampere of useful circuit capacity.

*In accordance with 1947 National Electrical Code

CRESCENT
INSULATED WIRE & CABLE CO.
TRENTON, NEW JERSEY

OVER 60 YEARS EXPERIENCE

IF IT'S IRON OR STEEL



REMEMBER to have it HOT DIP GALVANIZED

(DIPPED IN MOLTEN ZINC)

Only HOT DIP Galvanizing provides the heaviest practicable coating of zinc *inseparably bonded* to the steel. For the longest-lasting economical rust prevention, specify "Hot Dip Galvanizing" done by a member of the American Hot Dip Galvanizers Association. List of member plants available by writing to the Association's headquarters in the First National Bank Building, Pittsburgh 22, Pennsylvania.

tires, and the maker says it can climb a 10% grade with full load on the hook.

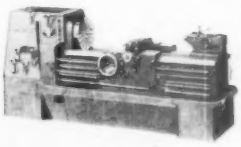
The load as well as the boom is raised and lowered by power. No part of the boom, no cables or chain pass over the driver's head. He can hoist, lower, or hold in neutral by finger-tip pressure on a single lever control. Automatic braking eliminates "run-away" loads.

Silent Hoist & Crane Co., 841-872 63rd St., Brooklyn 20, N. Y.

Nonslip Work Gloves

These fabric work gloves are coated with a Griptite nonslip finish. Called the Sureseal PK gloves, they are said to provide a firm grip in liquids, even including lubricants, without marring metals or machinery. The maker claims that the coating won't crack or peel and has a high resistance to chemicals. The gloves are made in various styles, with or without ventilated back.

Surety Rubber Co., 220 Hall Ave., Carrollton, O.



Lathe

Model S 16-in. lathe has a heavy spindle with 24 speeds, mounted on three heavy-duty bearings. A bearing at the middle of the spindle adds rigidity, says the maker. Ball or roller-type bearings are optional. The hole through the spindle can be slightly in excess of two inches when required.

Heavy hardened and ground gears provide a speed range of 15 to 1000 rpm., and higher or lower ranges can be furnished. A multiple disk, wet-type combination clutch and brake running in oil controls the spindle, or you can have mechanical reverse.

The combination of quadrant gearing and a 60-feed gear box permits quick changeover from standard operations to metric, module, and di-

Continued on page 275

(ADVERTISEMENT)

How Safety Was Delivered by Air!

It was late in the afternoon. BS&B Sales Engineer John Raidl was sitting at his desk, studying the SAFETY HEAD problem for a new chemical plant scheduled for construction. The telephone rang. Bayonne, New Jersey calling. An anxious voice, "Our new refinery is all ready to go. Except for one thing—we've got to have some special diaphragms for our SAFETY HEADS. The price isn't important. That plant must start operating the day after tomorrow! Can you send them by plane to arrive tomorrow night?"

Raidl jotted down the order. Two types of diaphragms were needed—three sizes — four different bursting pressures—lead lining or dipping on each diaphragm — all with vacuum supports tailored to fit. It was a tough order but he accepted it and immediately got in touch with R. S. Coffman, manager of the Diaphragm Department. He read him the order. "Great balls of fire!" roared Coffman, "They didn't miss a thing on that order, did they?" And they hadn't. "I can't do anything today — all the men have gone home—but we'll get rolling in the morning and you can consider the job done."

At five o'clock the next morning a workman lit the lead pots and the job was on its way. Two experts on material selection called "finders" got out their slide rules, made some rapid calculations, and selected four rolls of material from a stock that included the largest selection of thin ductile metals that is assembled in one place in the world. Allowance had to be made for the increase in bursting pressure that would result from lead lining and dipping. Samples were taken from each roll and inspected carefully for possible flaws. Two samples were dipped in the hot lead and the other two lined with thin lead sheet. Test diaphragms were made and burst to verify the bursting pressure estimated by the "finders." They were right on the money. Every sample proved out. Years of experience had given these men the know-how that could be obtained in no other way. A metallurgist from Quality Controls checked the materials to make sure they would do the job for which they were intended.

The green light was given to the fabricators. They cut material for the complete order, allowing for several extra diaphragms in each lot. On machines that were specially designed by BS&B, the diaphragms were formed and trimmed. Each one was put between flanges and tested up to 70% of its bursting pressure. They were checked for weak spots in the metal. None were found.

Behind BS&B's ability to deliver the goods on this rush order was the groundwork laid by a trained metallurgist.

The inspectors took over. They checked each diaphragm carefully. Two from each lot were burst. Every one burst within 5% of the pressure at which it was rated. One of the inspectors found a thin scratch on one of the lead-lined aluminum diaphragms and scrapped it. You can't take chances in this business. People's lives and millions of dollars worth of equipment are at stake. Three new diaphragms were made. Two were burst. The bursting pressure checked out.

It was almost noon and the vacuum supports still had to be made. Another call from Bayonne, New Jersey. "Will that order be here tonight?" Work on the vacuum supports began. Each one had to be hand-tailored to fit the diaphragm with which it would be installed. A vacuum support chart that had been prepared from years of experience was consulted and the thickness and type of metal selected. Vacuum supports and diaphragms had to fit perfectly. There could be no air space between them. Fabricators worked carefully and skillfully. The job was finally completed and each diaphragm and vacuum support given a final inspection. Every item was approved and tabbed.

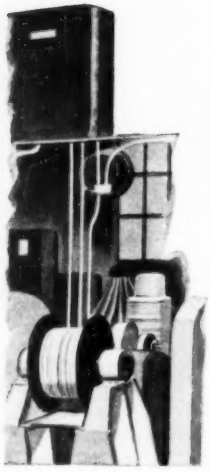
The job was rushed to the shipping department where the shipping manifest had been waiting since early morning. Each diaphragm and vacuum support was carefully packed to prevent possible scratching or denting. At 4:05 p.m. a special truck picked up the coveted package and whisked off to the airport eight miles away.

Threading his way through the heavy afternoon traffic, the driver finally screeched to a halt at the airport just as the plane taxied out to be loaded. He picked up his precious cargo, dashed into the airport office, and handed it over with the shipping manifests to a waiting clerk. As the plane roared down the runway for the takeoff with the package aboard, the driver stepped over to the telegraph office and wired the flight number to Bayonne, New Jersey.

That night an anxious group of engineers met the plane at the airport. They picked up the package and rushed off to their new refinery. A quick but careful installation of the SAFETY HEADS was made. The pipe line opened up. A new refinery was in operation. BS&B had come through!

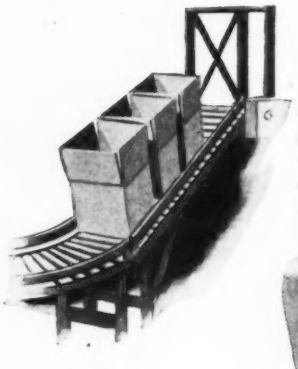
All orders for SAFETY HEADS are not filled as dramatically as this but they all get the same careful attention. If you have a pressure vessel protection problem in your plant, SAFETY HEADS may be your answer. Write today for complete details! Black, Sivalls & Bryson, Inc., Section SH-7, Special Products Division, Power and Light Bldg., Kansas City, Missouri.

BEST BET TO



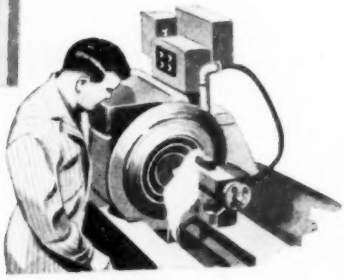
Boosted winding rate 300%

Here's a gain chalked up on the wire rewinders of a Pennsylvania steel company, by installing G-E adjustable-speed drives.



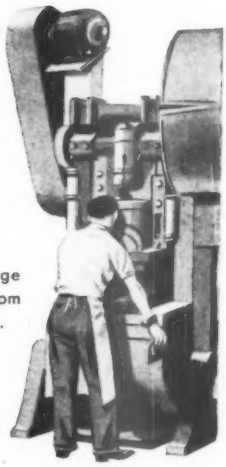
Speeded packaging 55%

Output of a box-sealing machine, newly equipped with adjustable-speed drive, jumped from 38,000 to 60,000 cartons per hour.



Stepped up punching 968%

A feat performed on a large punch press, hiking output from 78 to 800 parts per minute.

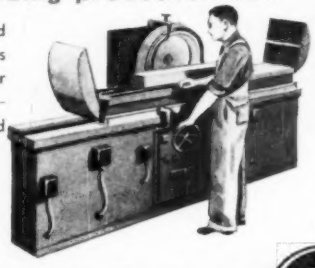


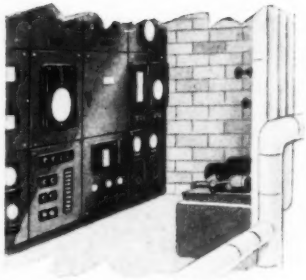
Raised turning output 66%

This was worked out by specifying adjustable-speed drive on an automatic lathe.

Increased grinding production 40%

This gain was achieved on a Buffalo company's face and knife grinder with—you guessed it—an adjustable-speed drive.





Speeded proportioning

A chemical manufacturer found it possible to go from batch to continuous processing in the production of phthalic anhydride by using adjustable-speed drives.

GENERAL ELECTRIC

BOOST OUTPUT

General Electric adjustable-speed drives can increase the output of your machines—make them more accurate, more versatile

Extra production you never expected may be ready to roll from your driven machines. Call it bonus production, since you get it by using improved speed control, and not by adding new machines. You can expect even more than boosted output from properly applied adjustable speed—it's a single-handed help in improving product quality, minimizing waste of time and materials, and cutting down on rejects.

Adjustable-speed drives have been around for years. But General Electric has brought them to a new high in versatility and power to work production miracles. Now you can buy G-E drives precision-engineered to your machines, at mass-production prices. Now you can choose from a complete line of General Electric Drives—packaged drives providing utmost flexibility. G-E drives offer plants that can use better speed control a quick way to halt the squeeze on profits.

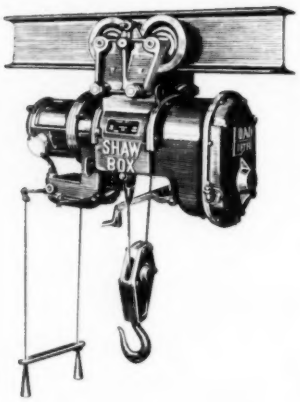
TO UNCOVER OPPORTUNITIES for saving through the application of adjustable speed in *your* plant, General Electric offers this help:

First, the assistance of specially trained sales engineers who bring you the benefits of experience gained in applying adjustable speed to practically every kind of machine in practically every industry. Pick up your phone now and call your nearest G-E field office. You'll find the telephone number listed in your directory.

Second, a comprehensive, carefully illustrated book on the ***whole*** subject of adjustable speed. It's written from management's viewpoint, but backed up with all the facts an engineer needs. Write for your copy. *Apparatus Department, Sec. 751-1, General Electric Company, Schenectady 5, N. Y.*

New G-E Booklet on Adjustable-speed Drives

Your copy of the new 24-page adjustable-speed booklet is ready. Please write for Bulletin GEA-5334 on your business letterhead.



complete answer...

When you're confronted with a tough lifting job that has you stumped — get a 'Load Lifter' Electric Hoist. It's the practical answer to every tough lifting problem you'll ever have. Its rugged strength, sturdy construction, mechanical superiorities make it possible for the 'Load Lifter' to lift capacity loads twenty-four hours a day, day after day, with the minimum amount of attention.

Look at these very special features built into every 'Load Lifter' whether it lifts 500 or 40,000-pound loads:

- **. . . one-point lubrication**
- **. . . two-gear reduction drive**
- **. . . inter-changeable suspensions**
- **. . . self-contained ball bearings**
- **. . . enclosed construction**
- **. . . fool-proof upper stops**
- **. . . safety lower blocks**
- **. . . no overhung pinions**
- **. . . machine grooved drums**

What do they mean? One-point lubrication insures thorough lubrication of bearings and gears every time the hoist is operated. Maintenance time is reduced for you pour oil into the gearing house at one point every six months. Fool-proof upper stops prevent over travel of the hook — no hoist damage.

Why not write us, today, about your load-handling problems? We'd like to help you solve each one.

'Load Lifter' Electric Hoists are built with lifting capacities of 500 to 40,000 lbs. in all combinations required for industrial needs. They are adaptable to almost every working condition within their capacities. Send for Catalog No. 215.

MAXWELL MANNING M&M MOORE

'LOAD LIFTER' *Hoists*

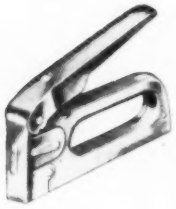
MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments.

YOU WANT TO KNOW

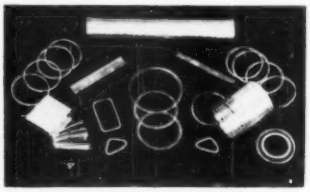
more about the items on this page

Letters to the addresses given will bring you further information.



TACKING MACHINE loads 150 pointed staples at a time. Use on wire-bound boxes, wooden boxes, cartons, cases. Said to be jam-proof. Locks to fit pocket. Arrow T-32 Gun Tacker takes staples in three sizes. Arrow Fastener Co., Inc., 30-38 Maujer St., Brooklyn 6, New York.

ALUMINUM-ON-STEEL BONDING protects steel against corrosion. Continuous process. Aluminum-covered steel can be further rolled to reduce its thickness. Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.



PREFORMED SOLDER in rings, pellets, washers, unusual shapes. For continuous or repetitive soldering. For flame, oven, resistance, and induction soldering. Kester Solder Co., 4201 Wrightwood Ave., Chicago 39.

WOOD PRESERVATIVE, said to be nontoxic, is based on synthetic resins. Contains solubilized copper fungicide. Effective against mold, decay, mildew, moisture. Helps prevent warpage and shrinkage. Brooklyn Varnish Mfg. Co., 50 Jay St., Brooklyn 1, N. Y.

COLOR METER compares and records colors of light sources. Breaks up beams, measures intensities, makes permanent record in form of graph. Sensitive to ultra-violet light. General Electric Co., Schenectady 5, N. Y.

FERRO-MAGNETIC MATERIAL for core applications. Nonmetallic substance, lightweight, similar to ceramics. No organic compounds. Said to be of uniform structure, suitable for mass production of varying sizes, shapes. General Ceramics & Steatite Corp., Keasbey, N. J.

TO PROTECT STAMPING DIES from injury by too-thick metal, continuous limit gage indicates when strip or sheet is too heavy. When used with die-stamping press, device sends out impulse which stops operation before metal reaches die. Range is from zero to 0.300 of an inch, with accuracy of 0.0005. Pratt & Whitney, Div. Niles-Bement-Pond Co., W. Hartford, Conn.

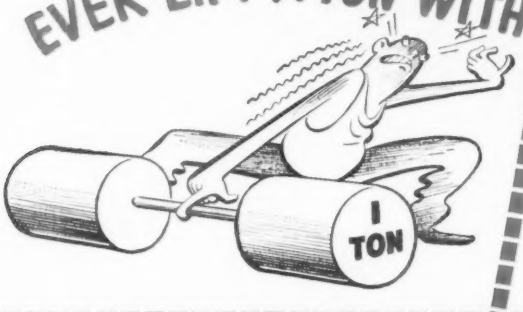
MAGNIFIER. Loupe has a 14-power cemented three-element lens. For fine inspection work. Lens is housed in solid machined barrel which folds into case. Chrome plated. Buhl Optical Co., Desk T-41, 1009 Beech Ave., Pittsburgh 12, Pa.

METAL-MARKING TYPEWRITER for production of name plates. Automark is electric with automatic feed. Interchangeable type sizes. Marks steel up to ½-in. thick. Cadillac Stamp Co., Dept. EL-11, 2138 Riopelle, Detroit 7.

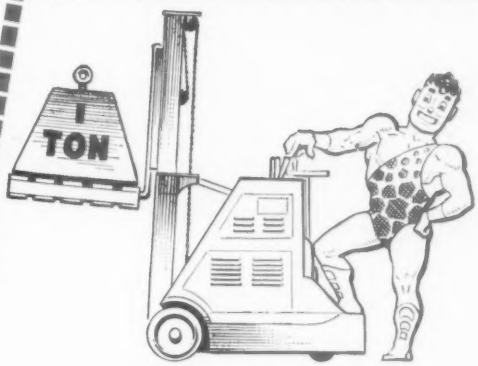
CONCRETE DRILLING is made easier with reference chart. Tells correct size bit to use for given size of pipe, conduit, bolt, anchor. Free. Tilden Tool Mfg. Co., 1995 North Fair Oaks, Pasadena 3, Calif.

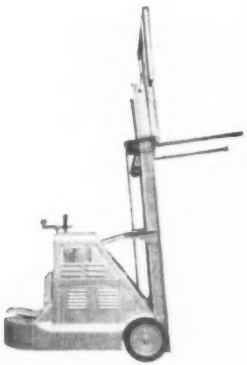
ACID SPRAY in plating and stripping tanks is minimized by floating small pellets of Bakelite polyethy-

EVER LIFT A TON WITH YOUR FINGER ?



it's easy with MOBILIFT





Three little easy-to-operate levers at fingertip level do all the work on a Mobilift. One hoists loads of a ton or more up to ceiling height. Another controls the tilt of the load. A third lever regulates the machine's travel speed. To make Mobilift even easier to operate it has no gears to shift—going forward or backward at the touch of a lever.

Such ease of operation has built Mobilift a reputation as the most maneuverable of all lift trucks—more trips per hour, more tons of materials per day. Let us show you why Mobilift's easy handling makes such a hit with both warehouse operators and business executives.

Mail the coupon below and we'll send you illustrated literature that explains more about Mobilift's cost-cutting advantages.

MOBILIFT CORPORATION FM-5
835 S.E. Main St., Portland 14, Oregon

Please send me your illustrated folder on Mobilift operation.

Name _____

Firm _____

Address _____

City _____ State _____

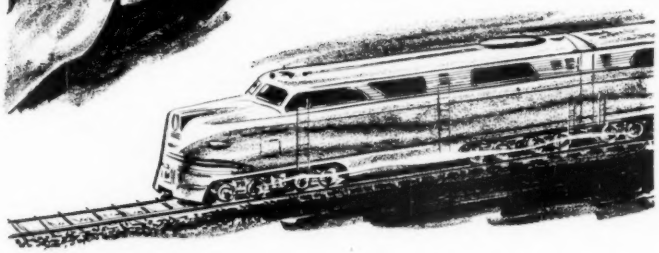
MOBILIFT
"The MIGHTY MIDGET"

District Sales Offices

NEW YORK CHICAGO BERKELEY LOS ANGELES ATLANTA DALLAS

Switch to JEWEL ABRASIVES for lower-cost finishing!

AP ENGINEERS RECOMMENDED SILVER STREAK BELTS FOR PHENOL PLASTIC SWITCH PLATES. SILVER STREAKS COST NO MORE THAN PREVIOUSLY USED BELTS, DID 25% MORE WORK, AND ELIMINATED SPOILAGE.



THE STAINLESS STEEL IN THESE STREAMLINED TRAINS WAS PROBABLY POLISHED WITH ESPECIALLY DEVELOPED JEWEL SILICON CARBIDE PAPER BELTS . . . BELTS THAT CUT FASTER, LAST LONGER, BECAUSE THE ABRASIVE IS CEMENTED TO A STRONG PAPER BACKING WITH BONDITE . . . A POWERFUL, HEAT-RESISTING ADHESIVE.

FOR TRICKY COMBINATIONS OF WOOD AND METAL, A PROMINENT GOLF CLUB MANUFACTURER HAS FOUND THAT NOTHING EQUALS HEAT-RESISTING BONDITE NEW PROCESS BELTS. LIKE ALL JEWEL BELTS, THEY HAVE AP'S EXCLUSIVE, SMOOTH-RUNNING VELVET JOINT, THAT WILL NOT JUMP OR SCRATCH THE FINISH.

SO REMEMBER JEWEL WHEN YOU ORDER COATED ABRASIVES. THERE'S A JEWEL PRODUCT FOR EVERY POLISHING AND GRINDING NEED. PROPERLY USED JEWEL ABRASIVES WILL SPEED YOUR WORK, CUT YOUR COSTS!

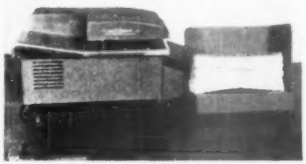
Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES

line on surface of liquid. Pellets act as heat insulator. Work may be easily removed from tank and pellets realign themselves. Jessall Plastics, Inc., 14 Sigourney St., Hartford 5, Conn.

MELT SNOW with Melt, which is said to have 12 times the thawing effect of salt. Use for loading docks or gutters; parking lots or rail switches. Won't damage tires, shoes, asphalt, concrete. Chem Industrial Co., 1114 Hippodrome Bldg., Cleveland 14.

SORE FEET? Airfoam insoles, called Wonder Walkers, are light, pliable provide circulation of air, insulate, and absorb perspiration. Easily cleaned. The Goodyear Tire & Rubber Co., Akron, Ohio.

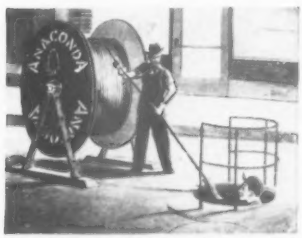


ENVELOPE OPENER automatically opens and stacks thousands of pieces per hour. Automatic cutting adjustment. Takes many sizes of envelopes. Self-lubricating bearings for quiet operation. Commercial Controls Corp., 1 Leighton Ave., Rochester 2, N. Y.

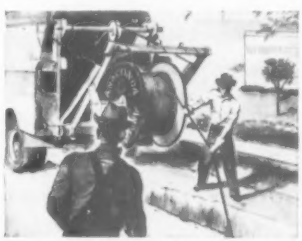
RECORDER for dictation, conferences, telephone conferences under wide range of conditions. Weighs 15 pounds. Records up to 3½ hours on each face of endless plastic band. Voice vibrations start machine. It stops when voice stops. Miles Reproducer Co., Inc., 812-814 Broadway, New York 3.

SELF-TAPPING SCREW, socket-head type. Suitable for parts which must be removed for servicing. Use standard key wrench to drive them into metal or plastics. Parker-Kalon Corp., 200 Varick St., New York.

IN THE AIR—In single or grouped conductors, Durasheath truly provides the one-type cable for all-type use.



IN CONDUIT—Moisture, oil, acid resistance of neoprene jacket make Durasheath an ideal cable for this application.



UNDERGROUND—Toughness of neoprene jacket assures long life of Durasheath when installed directly in the ground.

For power distribution between farm buildings, in street lighting systems, airports, mines, industrial plants, railroad signal systems, real estate developments—to mention a few—Durasheath gives you a *run* for your money. You can use Durasheath in a continuous run that is partly underground, in conduit and in the air. Here's why:

Tough neoprene jacket is *unaffected by electrolysis*, corrosion and extremes in temperature.

Greater flexibility makes handling easier.

It's rugged: high resistance to oils, flame, abrasion, cutting, impact and the moisture, acids and alkalies found in the soil.

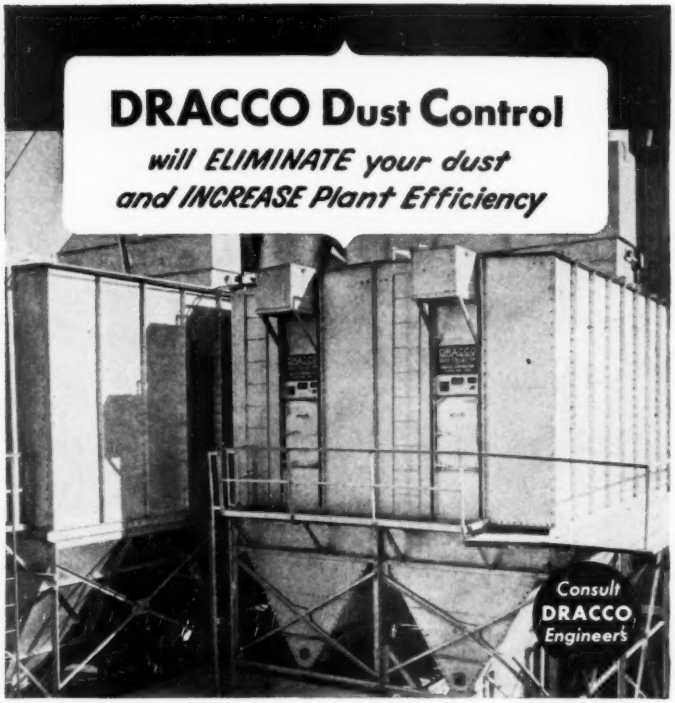
Specify Durasheath: available in small sizes or large, single or multi-conductor, to carry from 0 to 5,000 volts.

Durasheath

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4, N.Y.

ANACONDA
from mine to consumer



Dust, even in small amounts, reduces efficiency in ANY plant—and that is why it is so important to eliminate it. DRACCO Dust Control is saving millions of dollars each year because it increases plant efficiency by eliminating dust. Once installed the savings go on for years. DRACCO Dust Control reduces cost of maintenance and prolongs life of equipment; recovers valuable materials, and creates better working conditions that attract the better workers. Why not have DRACCO Engineers analyze your dust and fume control problems? They have the "know-how" gained from years of experience.

DRACCO CORPORATION
4091 E. 116th St., Cleveland 5, Ohio *New York Office:* 130 W. 42nd St.
DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

INDUSTRIAL FILMS

. . . Do you have a film that you would lend to other plant operating executives? If so, tell us about it, and we'll pass the information along. Be sure to say how and where other readers can get the film.

Easy on the Eyes is a 16-mm. film showing how safety glasses reduce accidents. It tells you how to select and use the proper type for different kinds of work.
National Safety Council, 20 N. Wacker Dr., Chicago.

Are you troubled by a lack of filing space? **Mechanized Record Filing** shows how one company solved this problem. It's a 27-minute 16-mm. sound motion picture, showing various types of mechanized filing cabinets and how to use them effectively.
The General Fireproofing Co., Youngstown 1, O.

Sittin' and Savin' is a color-sound slide film showing how to use capacitors to cut power costs. It runs about 15 minutes, and is designed specifically for the cost-conscious industrial plant engineer.
General Electric Co., Schenectady 5, N. Y.

Six discussion-type slide films on carbide single-point tool practice are put up in kits. Each kit includes supplementary booklets which further explain the tools being shown. These are intended for use as reference manuals in the shop.
Carboloy Co., Inc., 812 Book Bldg., Detroit 26.

Multipress Goes Hollywood shows you pictures of the different jobs the Multipress oil-hydraulic production tools will do. It explains the principles behind the vibratory hydraulic pressure which is harnessed to do broaching, trimming, forming, marking, assembling, and other operations. Film runs about 30 minutes.
The Denison Engineering Co., 1160 Dublin Rd., Columbus 16.

The story of tin is depicted in **Tinplate,** a 27-minute sound color movie. It shows step-by-step procedures from raw material to finished tin plate.
Film Library, U. S. Bureau of Mines, Pittsburgh.

How to Avoid Muscle Strains is a 16-mm. movie that uses both living models and animated drawings to demonstrate correct and incorrect ways to lift heavy objects. It runs about 15 minutes.
Bray Studios, 729 Seventh Ave., New York.

THE NEW SENSATIONAL

Stainless Steel

FIRE EXTINGUISHER

PROVIDES ADDED STRENGTH, NEW BEAUTY AND PERMANENT FINISH

- **Far stronger. Each Buffalo Stainless Steel Extinguisher tested to 500 lbs. (Ordinary types tested to only 350 lbs.)**
- **Nearly 7 lbs. lighter . . . light enough that a woman easily can operate it.**
- **Rust-Resistant, Acid-Resistant, Corrosion-Resistant, Oxidation-Resistant.**
- **Available in both Soda-Acid and Foam types. Size: 2½ gals.**
- **Approved by Factory Mutual and Underwriters Laboratories.**

This new Buffalo *better-built* Fire Extinguisher is the latest in Buffalo's complete line of fire-protection equipment. Buy from your local Buffalo jobber. If unable to secure, please write us for name of nearest distributor.

BUFFALO FIRE APPLIANCE
CORPORATION
DAYTON 1, OHIO
Established 1895

BUFFALO
better-built

Why Westinghouse Repair Service means *lower costs for you*

The cost of maintaining your electrical equipment is more than just the first cost of the repair job and the parts. It includes all your expenses of maintaining continuous production.

When you figure these expenses, Westinghouse Repair and Maintenance Service saves you important money:

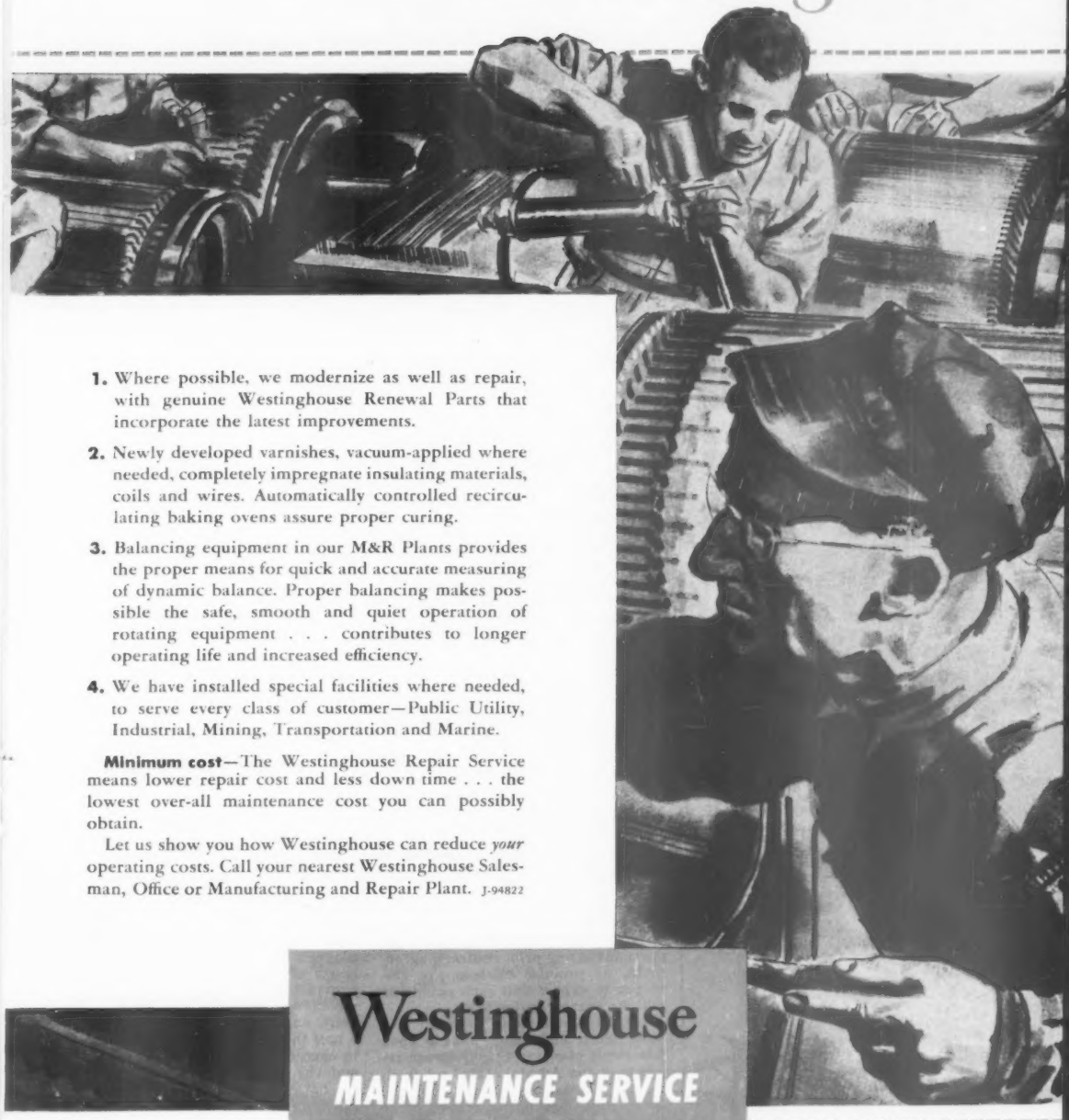
Fair prices—Our price schedules are set at a reasonable rate, made possible by our large volume of repair work. These prices are standardized throughout the country in our 36 Manufacturing and Repair Plants. Where needed, our Field Engineers make economical repairs in your own plant.

Guaranteed repairs—We guard against imperfections with rigid inspection standards, implemented with high-voltage, high-frequency surge comparative test equipment. With every rebuilding job goes the same one-year guarantee carried by new equipment.

Top performance—In repairing your equipment for top performance, we apply all new materials, tools and techniques developed throughout the Company. For example:

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



1. Where possible, we modernize as well as repair, with genuine Westinghouse Renewal Parts that incorporate the latest improvements.
2. Newly developed varnishes, vacuum-applied where needed, completely impregnate insulating materials, coils and wires. Automatically controlled recirculating baking ovens assure proper curing.
3. Balancing equipment in our M&R Plants provides the proper means for quick and accurate measuring of dynamic balance. Proper balancing makes possible the safe, smooth and quiet operation of rotating equipment . . . contributes to longer operating life and increased efficiency.
4. We have installed special facilities where needed, to serve every class of customer—Public Utility, Industrial, Mining, Transportation and Marine.

Minimum cost—The Westinghouse Repair Service means lower repair cost and less down time . . . the lowest over-all maintenance cost you can possibly obtain.

Let us show you how Westinghouse can reduce *your* operating costs. Call your nearest Westinghouse Salesman, Office or Manufacturing and Repair Plant. J-94822

Westinghouse

MAINTENANCE SERVICE

SHOP REPAIRS • FIELD REPAIRS

RENEWAL PARTS

STUART'S WISE ECONOMY PLAN

A SCIENTIFIC COST REDUCING PROGRAM

good cutting fluids properly applied

Write, wire or phone for details.

D.A. Stuart Oil Co. LIMITED

2735 S. Troy St., Chicago 23, Ill.

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University and a Member of the New York Bar

Period Surveyed: October 1 to November 1

Highlights of the New Wage-Hour Law

The new Wage-Hour Law, which becomes effective January 25, 1950, will make substantial changes in the old law.

The following is a summary of the basic features of the new law as it affects manufacturers.

MINIMUM WAGE—The minimum wage for all employees covered by the new law is increased from 40 to 75 cents an hour.

OVERTIME—Time and one-half the "regular rate of pay" must still be paid after 40 hours in any work week. Nothing in the old law defines what is meant by "regular rate of pay." The new law specifically provides that certain types of payments to employees need not be included in the "regular rate of pay" for the purpose of computing overtime. The principal items so excluded from the "regular rate of pay" are:

1. *Gifts and bonuses*—If they meet the requirement of any one of these definitions, gifts and bonuses need not be included.

(a) *Payments in the nature of gifts made at Christmastime or other special occasions*, as a reward for service, the amounts of which are not measured by or dependent on hours worked, production, or efficiency. It should be noted, however, that these sums must be paid as *gifts*.

(b) *Payments made in recognition of services* performed during a given period if both the fact that the payment is to be made and the amount of the payment are determined at the sole discretion of the employer at or near the end of the period, and not pursuant to any prior contract, agreement, *or promise causing the employee to expect that such payments will be made regularly.*

(c) *Payments made pursuant to a bona fide profit sharing plan or bona fide thrift plan* meeting the requirements of the Administrator set forth in appropriate regulations which he shall issue, considering, among other relevant factors, the extent to which the amounts paid to the employee are determined without regard to hours of work, production, or efficiency.

2. *Vacation, holiday, and sick leave pay*—Payments made for occasional periods when no work is performed because of vacation, holidays, illness, failure to provide sufficient work, or other similar causes need not be included in counting overtime.

3. *Repayment of expenses*—Reasonable payments for traveling expenses, or other expenses incurred by the employee in furtherance of his employer's interests and properly reimbursable by the employer, are not deemed part of the "regular rate" for overtime pay.

4. *Payment to welfare plans*—Contributions irrevocably made to a trustee or third person pursuant to a bona fide welfare plan covering pensions and insurance benefits also are excluded from the meaning of "regular rate."

5. *Premium pay*—Premium payments for certain work are excluded from the "regular rate" and may be *credited against overtime compensation*, provided the premium rate is not less than one and one-half times the rate established for like work performed in nonovertime hours on other days. This would apply to premiums paid for work on Saturdays, Sundays, holidays, or otherwise outside the basic, normal, or regular work day or work week established by contracts, if the premium paid satisfies the time-and-a-half requirement of the law.

6. *The Belo contract*—*The "Belo" type of contract* (providing for a guaranteed fixed weekly salary for employees whose hours fluctuate from week to week) is recognized as valid by the new law, but only if there is a bona fide individual contract or labor contract, if the employee's duties necessitate regular hours of work, and if the contract provides for (a) an hourly rate which is not less than 75 cents an hour, and overtime pay at time and a half that rate for all hours worked in excess of forty in any work week, and (b) a weekly guaranteed salary for not more than sixty hours. This provision requires that the employee must receive for work over sixty hours at least time and a half his stated hourly rate in addition to his weekly salary.

WHITE COLLAR EXEMPTIONS—The new law makes no substantial

With Water Tank and Vacuum for Rug Scrubbing

With Dispenser for Hot Waxing

★

Interchangeable Brushes, Pads, Sanding Disc

Wire Brushes

Fibre Brushes

Polishing Pad

Steel-Wool Pad

Sanding Disc

THE *Multiple-Purpose*
FLOOR-MAINTENANCE MACHINE THAT'S
Two Sizes in One!

Here is a floor-maintenance machine that not only can be used for many types of floor care, but also affords the further economy of a machine that is two sizes in one. This *100 Series Finnell*, in one of the larger sizes as shown above at left, can be reduced to the small size unit shown in circle.

Note the low, trailer-type construction of the machine, and how easily it goes beneath furnishings. Thus it is ideal for use in crowded areas. In fact, the dual size feature and low construction of the machine adapt it to use on many floors otherwise inaccessible to machine care.

As easy to handle as a household vacuum cleaner, yet this *Finnell* is powerful . . . fast . . . and thorough. Mounts a G. E. Drip-Proof Capacitor Motor . . . is equipped with Timken Bearings. And the ruggedly constructed worm drive, housed in an extra-capacity leak-proof gear case, lubricated for 1500 hours, assures smooth, noiseless performance. A precision product throughout. Three sizes: 13, 15, and 18-inch brush diameter.

For consultation, demonstration, or literature, phone or write nearest *Finnell* branch or Finnell System, Inc., 2512 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

Everything FINNELL for Floor Care

FINNELL SYSTEM, INC.

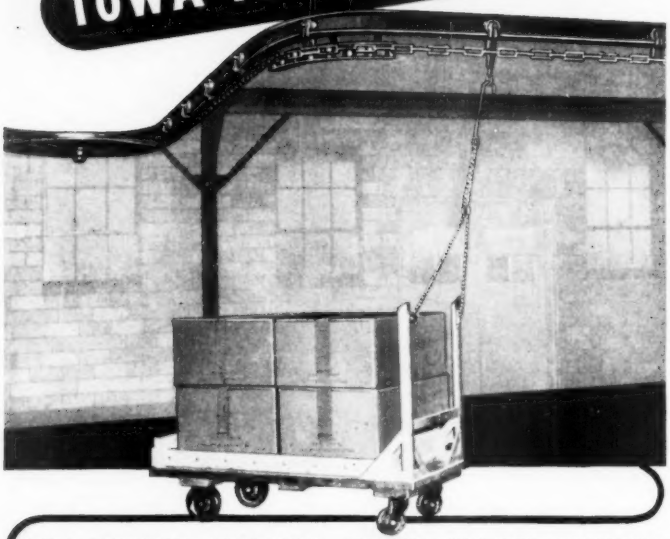
Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

ALVEY-FERGUSON Engineered

TOWA-FLOW CONVEYOR



THE MODERN, FLEXIBLE *TRUCK TOWING SYSTEM!*

Saves Time . . . Eliminates Costly Truck Pushing

Here's an idea! With an Alvey-Ferguson TowA-Flow you can adapt your hand truck operation to this modern, efficient conveying system. Clear your aisleways, save valuable time and relieve your employees from costly truck pushing. No alteration or damage to plant floors — the convenient, easy-to-maintain power chain of the A-F TowA-Flow is overhead. Trucks are easily and quickly attached without stooping.

The A-F TowA-Flow System, like all A-F Engineered Completely Co-ordinated Conveying Systems represents 48 years of know-how. Whether your plant can operate more efficiently with an A-F Gravity Roller, Power Roller, Belt or Pallet Conveyor these 48 years of know-how will point the way to greater efficiency and savings. Why be satisfied with less? Write for a discussion — today.

THE ALVEY-FERGUSON COMPANY

142 Disney Street Established 1901 Cincinnati 9, Ohio

Offices or Representatives in Principal Cities — Coast to Coast

CONVEYING EQUIPMENT

Alvey-Ferguson

METAL PRODUCTS CLEANING EQUIPMENT

LABOR DEVELOPMENTS *(continued)*

change in the exemptions for executives, administrative employees, and outside salesmen. The Administrator still is required to define these exemptions, under the new law.

HANDICAPPED WORKERS—Handicapped workers whose earning capacity is impaired by age or physical or mental deficiency or injury may be employed below the legal minimum rate under special certificate issued by the Administrator, for such periods of time as shall be fixed in the certificate.

COVERAGE—While the Act still covers employees engaged in the production of goods for commerce, the definition of the term "production" has been changed. The old law defined "production of goods" as including occupations that are *necessary* to production.

This definition is changed by the new law so as to include employees engaged "in any closely related process or occupation directly essential" to the production of goods for commerce. This change would seem to narrow the coverage of the new law. However, its effect will not be clear until the courts have ruled on the meaning of the new language.

ENFORCEMENT—Under the new law the Administrator may institute court action for back wages for an employee, provided the employee files a written report with him. Such a consent of the employee constitutes a waiver of the employee's right to sue on his own accord for back wages and liquidated damages. However, the Administrator may not institute such suit if it involves an issue of law which has not been settled by the courts. The Administrator is also authorized to supervise the payment of back wages to any employee entitled to payment under the Act.

It does not affect the Portal-to-Portal Act, which defines what is work time for which payment can be claimed and places a two-year limitation on back-pay claims. The new law does incorporate the features of the Overtime-on-Overtime Act. Existing regulations, orders, and rules of the Wage-Hour Administrator, not inconsistent with the new law, as well as liability for violation of the old law, are continued in full force and effect.

Labor Management Relations

JURISDICTION

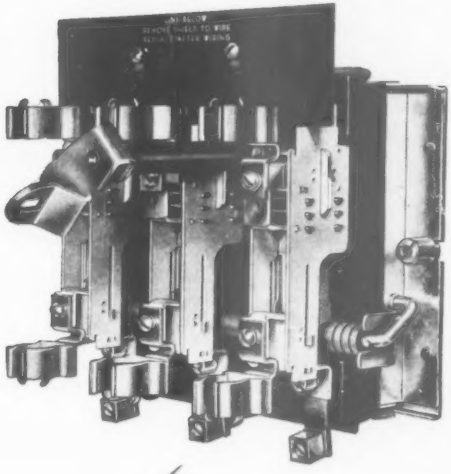
Retail and wholesale charcoal company held not interstate commerce within the meaning of the NLRA, although 92% of purchases, which amounted to $66,360, came from outside the state, and sales totaled in excess of $100,000, all being made

NOW... an ALL-NEW Type A Safety Switch for modern high-capacity distribution systems...

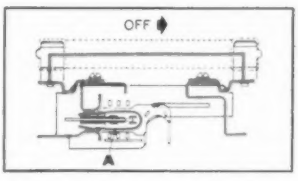
TRUMBULL'S HCI

HIGH **C**APACITY **I**NTERRUPTER

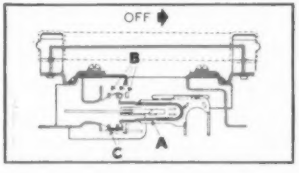
Unusually high interrupting capacity..."circuit-breaker" action breaks heavy loads quickly, safely. Extremely high momentary current capacity . . . withstands heavy short circuits without damage. 30-, 60-, 100-ampere sizes.



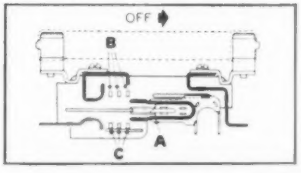
Here's How...
HCI's "Circuit-Breaker" Action Works



1. Switch closed. Spring-loaded sliding contact (A) fully inserted between stationary contacts. Red indicates current.



2. Sliding contact being withdrawn. The two arcs repel each other, are drawn against grid pins (B) and (C), which break and cool them.



3. Contact fully withdrawn. Trumbull's unique "Circuit-Breaker" action has effectively extinguished the arcs.

CHECK THESE ADDITIONAL SPACE-SAVING, TROUBLE-PREVENTING, LIFE-LENGTHENING FEATURES

Center-front operation permits close ganging.

Front fusing allows compact box, yet gives ample wiring space.

No exposed live parts when switch is OFF and door is open.

Handle interlock.

Clear ON and OFF markings both inside and outside.

No dead center—roller-cam action (multiplying linkage design with powerful spring) throws switch to full OFF and ON.

Poles are self-contained switching units for easy replacement.

Silver-plated current-carrying parts prevent oxidation . . . give low-resistance contact.

Insulating parts made of linen melamene, light, strong, arc-resisting.

Enclosed operating mechanism (on 60- and 100-amp. sizes) prevents wire chafing.

Interior removable for wiring ease.

Underwriters' approval throughout.

For more information about Trumbull's all-new HCI Safety Switch, write for your free copy of Bulletin TEC-10 today. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Connecticut.

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

ARCO'S SENSATIONAL

OPTONIC COLOR COMPASS

SENT **FREE** UPON REQUEST!

Accurate and Dependable as a Slide Rule

POINTS *INSTANTLY* TO THE *PROPER* COLORS . . .

Sounds unbelievable...but it's true! This ingeniously designed 11-inch diameter calculator is based upon Arco's nationally-known Optonic Color System. Not a gadget or toy, the Optonic Color Compass is scientifically designed . . . bases its recommendations upon location of areas to be painted and the quantity and quality of natural and artificial light present therein.

MAKES SCIENTIFIC COLOR RECOMMENDATIONS . . .

With the Optonic Color Compass to guide you there's never any question regarding the proper color to apply to walls, ceiling, dado, sash or trim. Better still, when you follow the recommendations of the Optonic Color Compass, you are assured that the colors used are more than just pleasing to the eye . . . science has proved them to be restful, unfatiguing . . . *perfectly balanced.*

ENDORSED BY USERS EVERYWHERE . . .

Introduced as the "Eye-Ease System" in 1938 by The Arco Company, the Optonic Color System is now recognized as the most scientific development in the principle of controlling the effects of light by the planned use of color. Optonic Colors secure the maximum benefits from the quantity and quality of natural and artificial light present in a room. Based upon the Ostwald System, each Optonic Color is in complete harmony with every other color in the system.

© "Optonic" is a registered trademark of The Arco Company

THE ARCO COMPANY • CLEVELAND, OHIO

ARCO

OPTONIC COLOR SYSTEM

SUPPLY LIMITED • WRITE TODAY

The Arco Company, Dept. F
7301 Bessemer Ave., Cleveland 4, Ohio
Please send Optonic Color Compass.

Name _____ Title _____

Company _____

Street and No. _____

City _____ Zone _____ State _____

LABOR DEVELOPMENTS *(continued)*

locally, none being to firms engaged in interstate commerce.
(Backart Coal Co., NLRB)

DECERTIFICATION

Decertification filed two days prior to the execution of a contract is timely, although prior to such filing of the petition the employer had voluntarily recognized the contracting union. To bar an election, voluntary recognition must result in a contract prior to the filing of a petition. Since the decertification raised a timely question of representation, the subsequently executed contract also was no bar to a representation petition filed by a rival after the execution of the contract.
(Monroe Cooperative Oil Co., NLRB)

Petition raises the question of appropriate bargaining unit and established principles for resolving the question are applicable.
(Richfield Oil Corp., NLRB)

EFFECT OF A PRESENT CONTRACT

Constitutes a bar to an election, although it supersedes and shortens the term of the original contract, where:

(1) the current contract is for a fixed and reasonable term;

(2) the fixed term, which was cut short by the later agreement, elapsed before the petitioning union made any claim to represent the employees covered by the contract;

(3) and making this later contract before the natural expiration of the fixed term of the first contract was not prejudicial to the petitioning union.
(Aluminum Co. of America, NLRB)

NO DISCRIMINATION

Discharging an active union member because he violated a company rule barring solicitation of funds for any cause without permission from the foreman was held not to be discriminatory, since the rule was one of long standing, the company had not condoned any prior violations, and all infractors were treated alike.
(Peerless Woolen Mills, NLRB)

Requesting employees to give their position and intention in a union drive, since this was tantamount to interrogation concerning union affiliation and activity which is barred by the Act because it is both coercive in tendency and a form of interference with employee's freedom to engage in self-organization.
(E. Brooke Matlack, NLRB)

INTERFERENCE

No solicitation rule providing:
"No employee is allowed to distribute any advertising pamphlets, or posters, nor sell tickets on games of chance, lotteries etc. Soliciting of any kind is prohibited."

Held illegal because it did not distinguish between applicability to working time and employee's own

WIDE BEARING SURFACE..BETTER GRIP..LONGER LIFE

FASTER? Yes sir, Flatweave Slings save time for several reasons. They're easier to handle because they're *extra* flexible and not inclined to kink. They readily pass through and under loads. Their wide bearing surface insures a far more secure grip on the load and results in a longer and lower-cost sling life.

In Flatweave Slings six wire ropes are woven together side by side—an exclusive Roebling construction. The wide, flat bearing area brings long-time safety by greatly increasing the sling's working life . . . Loops at each end of the sling can be slipped over hooks and lugs or used as chokers.

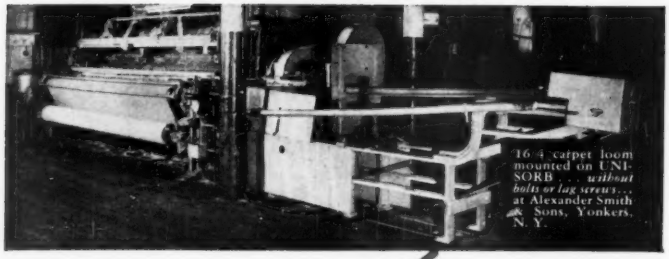
Get full information about Roebling Flatweave Slings, together with facts on the whole Roebling line—a sling for new efficiency and economy in every kind of hoisting, loading and moving service. Simply ask for your copy of the "Roebling Sling Data Book." John A. Roebling's Sons Co., Trenton 2, N. J.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ ***Boston,*** 51 Sleeper St. ★ ***Chicago,*** 5525 W. Roosevelt Rd. ★ ***Cleveland,*** 701 St. Clair Ave., N. E. ★ ***Denver,*** 1635 17th St. ★ ***Houston,*** 6216 Navigation Blvd. ★ ***Los Angeles,*** 216 S. Alameda St. ★ ***New York,*** 19 Rector St. ★ ***Philadelphia,*** 12 S. 12th St. ★ ***Pittsburgh,*** 855 W. North Ave. ★ ***Portland, Ore.,*** 1032 N. W. 14th Ave. ★ ***San Francisco,*** 1740 17th St. ★ ***Seattle,*** 900 First Ave.

ROEBLING

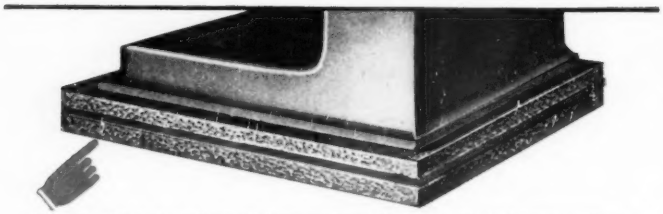
☆ *A CENTURY OF CONFIDENCE* ☆



ALEXANDER SMITH MOUNTS LOOMS ON

UNISORB

. . . drilling avoided . . . floors saved!



Here's why one of the well-known firms in the textile industry anchors looms, preparatory machinery and finishing machinery the modern way . . . *on UNISORB!*

TRANSMITTED MACHINE NOISE and VIBRATION REDUCED 60% to 85%

Lowers machine and building maintenance costs

Higher speed machine operation often possible

UNISORB ANCHORING REQUIRES NO BOLTS, NO LAG SCREWS

Old-fashioned, destructive floor drilling eliminated

Saves installation time as much as 80%. Labor costs reduced

Maintenance on machine mounting practically eliminated

Clip this coupon, or write us on your letterhead today . . .

THE FELTERS COMPANY

210-A SOUTH STREET, BOSTON 11, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, Cleveland, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.

Makers of FELTS in all colors, thicknesses, consistencies, qualities . . . for all purposes. Rolls, strips, sheets and precision cut felt parts.

Gentlemen: Please send my free copy of "Why It Pays to Anchor Your Machines with UNISORB." ( )

NAME ..... TITLE .....
COMPANY NAME .....
STREET .....
CITY ..... STATE .....

Whatever your industry . . . whatever the nature of the flooring in your plant . . . anchor your machines on UNISORB

LABOR DEVELOPMENTS *(continued)*

time, and illegal to the extent that it was applicable to latter.
(Rex Mfg. Co. Inc., NLRB)

Solicitation of individual strikers to return to work, because it has the effect of undermining the authority of the bargaining agent and goes beyond the free speech protection provided in Section 8(c).
(Cincinnati Steel Castings Co., NLRB)

Employer's conducting poll of employees as to choice of bargaining representative.
(Stocker Mfg. Co., NLRB)

NO INTERFERENCE

When an employer had taken pains to assure his employees of their right under the law to select a bargaining representative of their own choice, his statement during a heated argument that "We can't recognize any organization and, by God, we never will,"—is not an unfair labor practice.
(Peerless Woolen Mills, NLRB)

EMPLOYER REFUSAL TO BARGAIN

A company is not relieved of the duty to bargain with a union merely because it relied upon the erroneous view of the General Counsel that an affiliated union cannot be in compliance when the parent A. F. of L. had not complied. In ruling that the General Counsel's interpretation of the requirements of the Act is no defense, the Board stressed the fact that the primary function of the General Counsel "is to investigate charges and prosecute cases before the Board. The task of making binding interpretations of the meaning of the Act is a judicial function vested in the Board."
(West Texas Utilities Co. Inc., NLRB)

Insistence that union post a performance and indemnity bond, retraction on clauses previously agreed upon, unilateral granting of wage increases during negotiations, statements by the employer that he would probably never enter into a contract, refusal to discuss wage rates, insistence that working hours, hiring, firing, promoting and demoting should remain within the exclusive prerogative of management.
(Brown & Root Inc., NLRB)

Refusing to incorporate prevailing wage rates in contracts, extended delays in arranging for meetings with union, always waiting for union to suggest meeting, failure to make counterproposals.
(Rex Mfg. Co., NLRB)

Refusing to permit a union representative to participate in negotiations and ordering him off premises, reminding union negotiating committee privately that employer official had predicated they would have privileges and freedom if they selected union as bargaining representative, engendering a continuous state of un-

SAID MR. DRIVER: "The sash in these two reinforced concrete buildings had been a constant maintenance problem. We made test installations of new type glass panel replacement in 1940 and watched these test installations carefully for five years. As they were still in excellent condition, had proven their worth, and as the desired type of block was readily available in 1946, we then began the replacement of all steel sash in those buildings with glass blocks. This is now 70% completed."

BEFORE

AFTER

Big sash replacement project utilizes PC Glass Blocks to effect notable savings

ONE of the world's largest installations of PC Functional Glass Blocks is now nearing completion in twin buildings at the Brooklyn properties of the New York Dock Company. According to Chief Engineer, Mr. L. E. Driver, replacing old sash with these glass blocks has cut the load on heating approximately 40% to 50%—and no auxiliary heating equipment is needed, as was the case in the past. PC Glass Block panels were found to be just as effective in keeping hot air and the heat of reflected sun *out*, as they were in retaining interior heat in winter. Furthermore, an additional saving has been effected in the reduction of window-washing contracts. And, since PC Glass Block panels seldom need repairs or replacement . . . never require painting . . . a major maintenance problem has been eliminated.

Then, too, this installation has proved its value in providing excellent light diffusion. The considerable steam and vapor involved in the various manufacturing processes of the buildings' tenants — including food processing, candy making, corrugated box manufacturing, etc.—have had no effect upon the glass block panels. Condensation has not been a problem.

These are some of the important savings and advantages available to management — when old sash is replaced with handsome, economical PC Glass Blocks. Why not find out what they can do in your buildings? Our specialists will be pleased to advise you, without any obligation on your part. Meanwhile, send for our free booklet on the use of PC Glass Blocks in Industrial Buildings. Use the convenient coupon below.

INVITATION—You are cordially invited to visit our booth at the Plant Maintenance Show, Public Auditorium, Cleveland, Ohio—January 16-19, 1950. **BOOTH NO. 417**

Pittsburgh Corning Corporation
Dept. H-129, 307 Fourth Avenue
Pittsburgh 22, Pa.

Without obligation on my part, please send me a FREE copy of your booklet on the use of PC Glass Blocks in Industrial Buildings.

Name_____

Address_____

City_____ State_____

PITTSBURGH PC CORNING

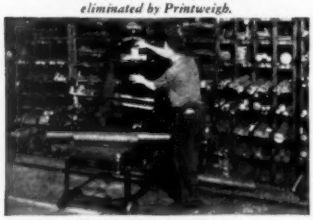
GLASS BLOCKS

The mark of a modern building

Distributed by Pittsburgh Plate Glass Company; by W. P. Fuller & Co. on the Pacific Coast, and by Hobbs Glass Ltd. in Canada.

PRINTWEIGH STOPS LOSSES!

Costly errors in handling materials eliminated by Printweigh.



Printweigh keeps stock room records RIGHT!

Prints BIG figures—ACCURATE weights—with split-second speed!

POSITIVE CONTROL OF COSTS

Eliminate human errors in reading, remembering and recording weight figures —stop losses that *directly affect your costs, profits and customer relations!*

PRINTWEIGH SCALES give you *accurate printed records* of each weighing operation . . . positive assurance that your weight facts are right *every* time! Prints big, clear figures . . . on thick tickets . . . on large or small sheets . . . on strips . . . with extra copies. Saves time, stops losses for receiving, shipping, stock rooms, batching and many other weighing operations. Write for bulletin 2021. Toledo Scale Company. Toledo 12, Ohio.

Beware of Human ERROR!

Errors in reading, remembering and recording are the birthplace of LOSS. Printweigh stops human error.

TOLEDO
HEADQUARTERS FOR SCALES

LABOR DEVELOPMENTS *(continued)*

certainty as to whether certain management officials had authority to make definite commitments, offering such a complex and incomplete wage schedule as to make it of no substantive value, rejecting proposal to continue existing vacation practice.
(Deena Artware Co. Inc., NLRB)

EMPLOYER RESPONSIBILITY

Where employees engaged in unlawful practices were agents of the management and believed by the employees to be acting for and on behalf of management (one was personnel adviser, the other was adviser to superintendents and foremen on matters affecting employees who are members of minority groups).
(Olin Industries, NLRB)

HELD NOT AN EMPLOYER REFUSAL TO BARGAIN

Refusal to furnish a written list of the names of the employees in the bargaining unit, with their classifications and wage rates where employer was willing to furnish such information orally in regard to all employees named by the union and in this fashion did give such information to the union as to about 70% of the employees. Employer is not obligated to furnish information necessary for collective bargaining in the form demanded by union provided the information is made available in a manner which is not so burdensome or time-consuming as to impede collective bargaining.

Rejection of union demands for union security provisions where substantial concessions were made by employer on other important issues.

STRIKE

A strike which has for its purposes the achievement of economic aims and to compel employer to cease unfair labor practices is an unfair labor practice strike. A strike caused in part by unfair labor practice does not lose its character as unfair labor practice because economic reasons may also be the cause thereof. Such strikers must be reinstated.
(Julian Frevrich Co., NLRB)

STRIKERS—REINSTATEMENT

Employer need not discharge replacements to make room for unfair labor practice strikers because of length of time that elapsed between the abandonment of the strike and the date of hearing, without any application for reinstatement by the strikers during that period. Reinstatement offers must be made if jobs are available. If no jobs are available, they must be placed on preferential list to be offered jobs as same become available.
(E. A. Laboratories, NLRB)

Illegal activities of former employees cannot be imputed to strikers in absence of evidence establishing the responsibility of the strikers for such

THE "ZIP" WORKS FOR PENNIES – SAVES DOLLARS Every Day!

Want to cut handling costs? Then take a tip — buy a Zip! It's a small investment that pays off in big savings, and not just for a year or two but for years to come.

There's no compromise in design. It's quality-built—from interchangeable mounting right down to the lifting hook — with features you'd expect only in far costlier hoists.

That's what makes the Zip-Lift the fastest selling wire rope hoist on the market. Ask a P&H representative for facts. Or write us today.

Handle it "Thru-the-Air"

P&H ZIP-LIFT

HARNISCHFEGER CORP. MILWAUKEE WIS.

Look At These Added Values

SAFER — Full magnetic control with control current reduced to 110 volts at the push-button. Plugging crane type limit switch and large double brakes provide maximum safety. No open wiring.

LIFETIME CONSTRUCTION — Precision built — shaved gears running in oil — grease-sealed antifriction bearings — fully enclosed, moisture-proof, dust-proof, acid-proof.

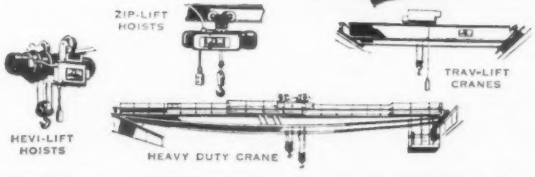
SMOOTHER OPERATION — Motor specifically built for hoist service — to withstand frequent reversal. Loads controlled within a fraction of an inch.

ALERT SERVICE—Out-of-stock delivery from qualified dealers everywhere—backed by 18 branch offices and 8 conveniently located warehouses.

The Zip-Lift is America's fastest selling wire rope hoist. Handle it "Thru-the-Air" at lower cost.

See how handling problems like your own can be solved by the Zip-Lift. Send for this picture-filled book of ideas, applications, specifications, etc. Ask for Bulletin H20-4.

Available in Capacities up to 2000 lbs.



P&H

ELECTRIC HOISTS

4525 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

HOISTS · WELDING ELECTRODES · MOTORS · P&H · EXCAVATORS · ELECTRIC CRANES · ARC WELDERS

IF YOU WANT TO KNOW HOW TO CUT YOUR COSTS..

COME to Cleveland in January.

VISIT the Plant Maintenance Show. See the exhibits. Examine and compare the plant equipment and services that make low-cost production possible.

ATTEND the technical sessions. Listen to discussions of the newest and best ways to keep your plant operation at peak efficiency.

PLANT MAINTENANCE SHOW

YOUR SHOW . . . for the first time you and other key members of industry's cost-cutting team will have your own show.

YOUR OPPORTUNITY . . . an unparalleled one for

- Vice presidents in charge of operations
- Plant managers
- Plant superintendents
- Chief engineers
- Maintenance men

and others whose ultimate responsibility it is to select, install, operate, and maintain the equipment and services needed for efficient, low-cost manufacturing.

PUBLIC AUDITORIUM
CLEVELAND
JANUARY 16-19, 1950
Show Management: CLAPP & POLIAK, Inc.
341 Madison Avenue, New York 17, N. Y.

LABOR DEVELOPMENTS *(continued)*

conduct, employer was not justified in refusing to reinstate them.
(Deena Artware, Inc., NLRB)

UNION SECURITY

The Board held that an employer who in his contract with an independent union included a union security clause was guilty of an unfair labor practice even though there was no attempt to enforce the provision. The mere incorporation of such a provision in the contract was held to serve as a restraint upon those who did not wish to participate in union activities.
(Julius Resnick, Inc., NLRB)

UNION MEMBERSHIP

An international union does not have the right to expel members from local unions, even though the expelled members have disclosed confidential information, which disclosure was detrimental to the international union. A reading of the constitution convinced the Court that it was no unintentional oversight that such authority was denied the international. On the contrary, a careful reading of the constitution disclosed a deliberate intention to withhold such power from higher officers or bodies and invest it in the local union.
(Sage *v.* UAW)

SUPERVISORS

Fixers in textile manufacturing plant whose main duty is to patrol their respective sections and inspect quality and quantity of work performed by employees under them, and who have the authority to discharge or effectively recommend discharge of employees.
(Dixie Mercerizing Co., NLRB)

ARBITRATION—EFFECT OF AWARD

Where an arbitration award was rendered, the Court will not grant a review, even though the award was rendered pursuant to a compulsory arbitration statute which was declared unconstitutional.
(Public Service Co. *v.* Camden Coke Federation, N.J. Sup. Ct.)

REFUSAL OF UNION MEMBERSHIP

Since membership in a union is exclusively a matter of the internal management of the union, the Court will not compel acceptance of membership therein.

> "Membership in a labor union is a privilege which the law in this state permits a union to deny, however worthy the applicant and unfortunate his economic plight because of his exclusion. There is no charge here that the denial of membership was brought about by unlawful conduct or that the union resorted to coercion or other improper means to deprive the plaintiff of employment. In final analysis the sole grievance is the refusal to

MINNEAPOLIS-MOLINE
MODERN MACHINERY

INDUSTRIAL WHEELERS

Speed Material Handling and Maintenance

Preferred for OUTSIDE PLANT JOBS!

You can put loading crews on production jobs by using MM Industrial Wheelers to handle all types of bulk or palletized material with big savings in time and dollars.

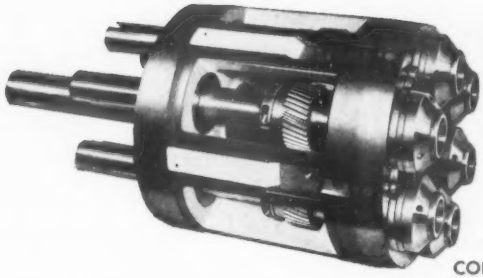
Mobile MM Industrial Wheelers are available with the Shuttle Gear for 6 forward and reverse speeds up to 14.5 m.p.h.

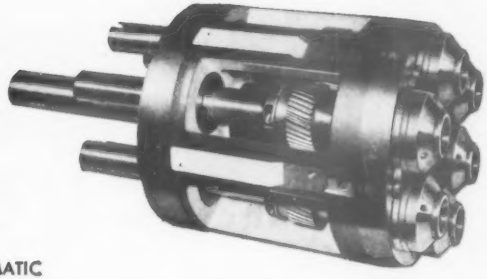
Easy handling is the result of MM engineered Roller Spin Steering that makes fast maneuvering easy and reduces operator fatigue.

High capacity—up to 10,000 lbs. on the front end and heavy duty, extra-diameter clutches make MM Industrial Wheelers the outstanding choice for heavy industrial application.

For doing all your jobs, various attachments are available including loaders, dozers, scrapers, mowers, broom and winch. They can be installed simply and easily on mounting pads that are part of the tractor.

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA





CONOMATIC
1½" 6-Spindle
CARRIER

CARRIER FRAME INFORMATION

Rugged

ARE YOU

CARRIER FRAME INFORMATION

1. One piece — 615 pounds
2. Nickel Moly Iron (normalized)
3. Overall Length — 20"
4. Bearing Length — 5.04"
5. Bearing Area — 306.6 sq. in.

(Full information available)

SUBJECT TO WITHHOLDING?

The withholding of information regarding the facilities of machine tools would be unintentional. But the use of generalizations and approximations, instead of specifications, actually is withholding. Generalizations fail to establish the superiority of a machine's facility through terms which lack a definite basis of comparison. They leave an impression of doubt as to tangible substantiation.

There is nothing definite about a "roomy" tooling area; nothing specific about a "rugged" tool slide, and nothing comparative about a "massive" frame.

The dispensing of machine information is the responsibility of the manufacturer. Realizing this, CONE has prepared an analysis chart that should prove very useful to those seeking more specific information about multiple spindle automatic bar machines. Your copy is free. There is no obligation.

A comparison with ALL Automatics will lead you to

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

*CLARK materials-handling methods and machines constitute a team that CURBS wastes common to most handling operations. When and where this team goes to work, savings start CLIMBING as of "right now," and break-even points fall quickly to "breathe-easy" points. You can't beat this team, but you can join it to bring down production COSTS to a comfortable level.

How several blue-chip industries are curbing costs to the benefit of their profits is told and illustrated in "Material Handling News," the interesting "tell how" magazine and in Clark's "show how" motion pictures. You can use both to advantage simply by requesting them on your business letterhead.

CLARK
ELECTRIC AND GAS POWERED
FORK TRUCKS
AND INDUSTRIAL
TOWING TRACTORS
INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 12, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

admit the plaintiff to membership. The law does not regard such refusal as actionable (Simons *v.* Berry, 210 App. Div. 90; Colson *v.* Gelber, 192 Misc. 520; Acierno *v.* North Shore Bus Co. Inc., 173 Misc. 79; Matter of Miller *v.* Ruehl, 166 Misc. 479). (Feinne v. Monahan, N.Y. Sup. Ct.)

Administration of Contract

SUBCONTRACT

Where a company has been doing certain work for another company and had also been doing work on its own equipment by employees covered by the agreement, the Company had the right to have its work done by a third company and the grievance over subcontracting was held not to be arbitrable.

In the absence of a specific scope provision that the contract covers all work then and theretofore customarily done by the company's employees and not such as had been customarily contracted out (particularly when the absence was not inadvertent), the union cannot claim such a provision by implication, nor may an arbitrator write such a provision in the agreement.
(Pan American Airways, Inc.)

BULLETIN BOARD

Under a clause that the company "will provide bulletin boards . . . and will put thereon approved notices of union meetings and union activities as may be submitted by the union for such posting," the company was justified in refusing to post comparative hourly rates of pay for certain jobs.

Under the clause, since the company has the right of approval (sole or joint), it did not violate the contract, "unless the union could prove that the intent of the article (of the contract)—as brought out during the negotiations of the contract, or by past practice, or by the interpretation of similar articles elsewhere—differed from the meaning that the actual wording of the article indicates. Under such circumstances, the burden of proof is on the union."
(Reynolds Metals Co.)

DISCHARGE—PROPER PROCEDURE

Management's failure to make clear to an employee that he was discharged made management obligated to restore the employee's seniority rights, though not required to grant him back pay. Since the aggrieved employee was under the impression that he was laid off, he was lulled into a false sense of security in the belief that he would be recalled when work was to be had, without loss of seniority.
(The Thor Corp.)

NO-STRIKE CLAUSES

Provide that anyone inciting to or inducing strike or stoppage shall be

New, Unique Simplicity!...

in custom-engineered

ELECTRONIC

INSPECTING

AND SORTING

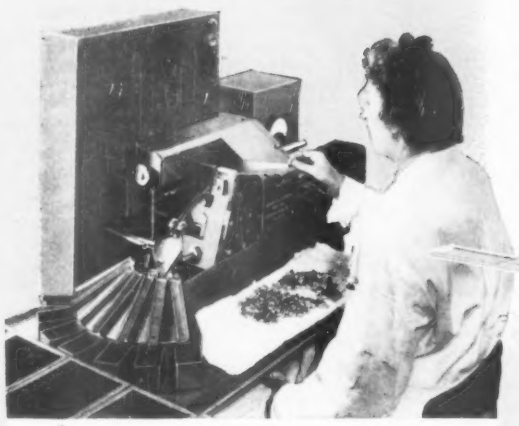
EQUIPMENT

Through basic engineering developments, Brown & Sharpe custom-builds uniquely simple inspecting and sorting machines for precision parts. Machines of this description made by Brown & Sharpe have the advantages of simpler, sturdier construction; more stable adjustments; and easier manipulation of sensitivity.

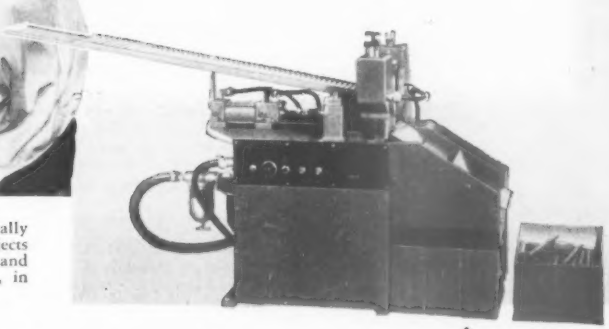
This modern equipment can be designed and built to meet individual needs for:

1. *Manual loading and disposal*
2. *Manual loading and automatic disposal*
3. *Automatic loading and automatic disposal*

Why not turn over your problems of providing efficient gaging and sorting equipment to Brown & Sharpe? Send an outline of your requirements. Learn what Brown & Sharpe can offer in custom-engineered equipment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



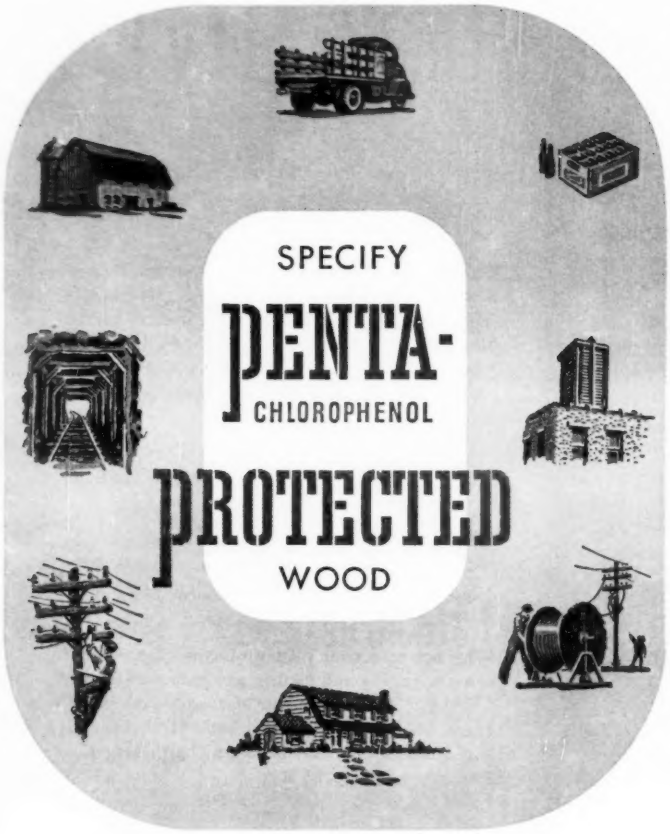
This single-motor, compact machine automatically gages and sorts antifriction bearing rolls. It rejects rolls above or below manufacturing tolerance and separates accepted rolls into 5 sized categories, in increments of .00002".



This machine gages and sorts straight sleeves—measuring for length as well as diameter at both ends. The sleeves are segregated into four categories. **1.** *Oversize and undersize in length regardless of diameter.* **2.** *Small in diameter at either or both ends.* **3.** *Large in diameter at either or both ends.* **4.** *Good sleeves within tolerance.*

The machine has a production rate of approximately 3000 per hour. The capacity is adjustable for different lengths and diameters. It is loaded manually with automatic disposal.

BROWN & SHARPE B·S



Wherever wood is used it will pay you to consider the advantages of PENTA-protected wood.

"PENTA"-protected wood means lower building costs, fewer maintenance worries and longer life for wood structures.

Widely used in home, farm and industrial construction, PENTAchlorophenol is rapidly revealing new uses for wood—the *economical* building material. It effectively protects wood from termites and decay. Wood that is "PENTA"-treated is clean and easy to handle . . . paintable too, when the proper solvent is used.

Safeguard *your* wood construction and *your* budget—specify "PENTA"-treated lumber. For additional information write Dow, Dept. PE 55A.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

Specify lumber that's
PENTA-PROTECTED
CHLOROPHENOL
against decay and termites

DOW
penta-
chlorophenol

LABOR DEVELOPMENTS *(continued)*

subject to dismissal, even though no strike actually materializes or results in interference, restraint, or coercion.

The mere clause that "During the term of this agreement there shall be no cessation of work through strikes or lockouts" is insufficient to sustain a discharge.
(Shell Oil Co.)

DISCHARGE—DUTIES OF UNION OFFICERS

A discharged employee who participated in a strike in violation of a no-strike clause of the contract is guilty of having breached the contract, even though at the time he participated in the strike he was not an employee. Since under the contract every discharged employee had the right to appeal his discharge through grievance procedure, he was under a continuing obligation to live up to the terms of the agreement.

The arbitrator said:

"Officers and committeemen of a union have responsibilities in a strike situation which are greater than those of ordinary union members (Stockham Pipe Fitting Company, 4 LA 744; Bethlehem Steel Co., 6 LA 617, 622-623). A word from Kelly might have put the men back to work at any time during the three weeks' strike. All he needed do was to urge the men to return to work and to say that his grievance would be taken up as provided under Article V, Section 1. Instead, he attended meetings at which there was no evidence of his willingness to try to stop the illegal strike. He picketed daily. He persistently refused to use the grievance procedure which he had helped to establish in negotiations."
(American Brake Shoe Co.)

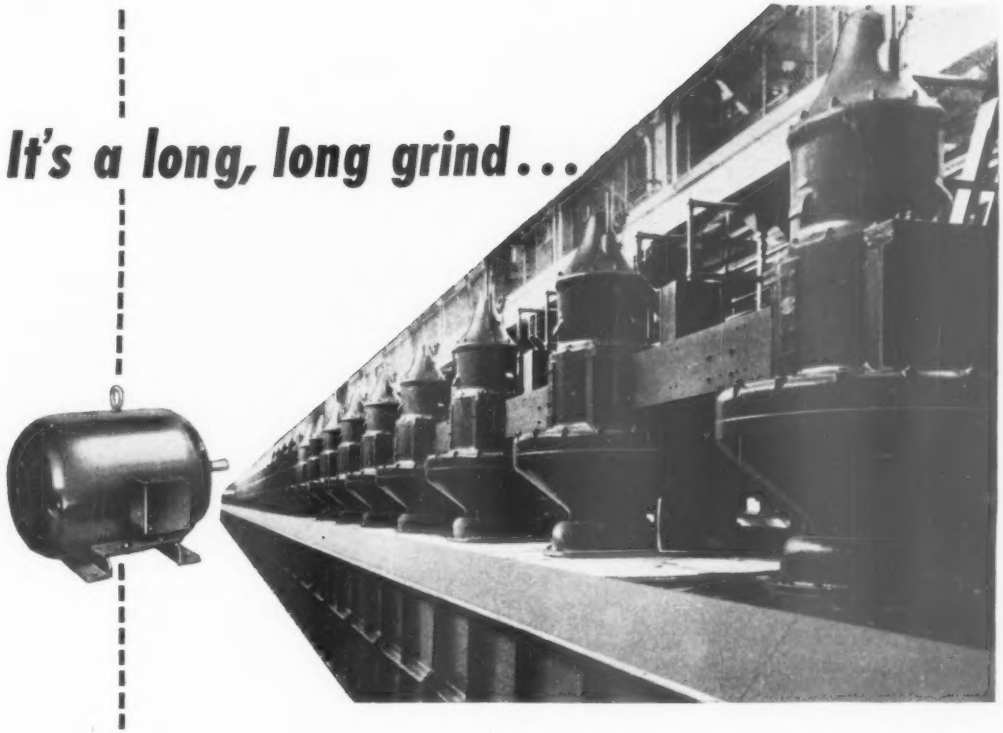
OVERTIME

Provide the penalty for refusing to work overtime. Without such a proviso, discharge may be deemed too severe; the right will not be inferred from a mere clause, particularly where the refusal to work is not a willful violation of the clause.

Without such a clause, the company does not have the unrestricted right summarily to discharge workers who have a good reason to decline overtime after warning.
(National Folding Box Co.)

"Once the base hourly rates for time and incentive workers are rationally aligned by means of job evaluation or other criteria, the resultant wage structure may be raised or lowered according to prevailing economic conditions, the relative bargaining strength of the parties, or any other criteria. Such considerations are independent of the job evaluation and incentive plans.
(Rheem Mfg. Co.)

It's a long, long grind...



but it's not too tough for Wagner *CP* Motors

Glass is vital to modern automobile production. Grinding and polishing vast amounts of safety glass to the perfection demanded by the Ford Motor Company require 24 hour operation with huge lines of machines like the one pictured above. This installation consists of two grinding lines with 60 units and two polishing lines with 100 units. It is significant that each unit is driven by a Wagner 40 hp type CP motor!

Wagner type CP totally-enclosed, fan-cooled motors are designed to operate efficiently in atmospheres filled with dust, fumes, moisture and other agents that quickly ruin open type motors. They stay on the job, requiring no maintenance other than periodic lubrication, in spite of the destructive elements in the surrounding atmosphere. You will find CP motors a lasting investment in continuous, troublefree motor performance.

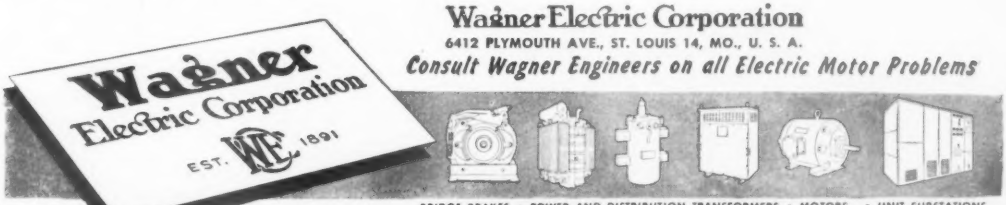
More than fifty-five years of experience stand behind every motor bearing the Wagner name. Nationwide service facilities are available to users of Wagner Motors.

Call any of our twenty-nine branch offices located in principal cities and manned by trained field engineers, for advice on all of your motor problems. Bulletins on the complete line of Wagner Motors will be sent upon request.

Wagner Electric Corporation

6412 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.

Consult Wagner Engineers on all Electric Motor Problems

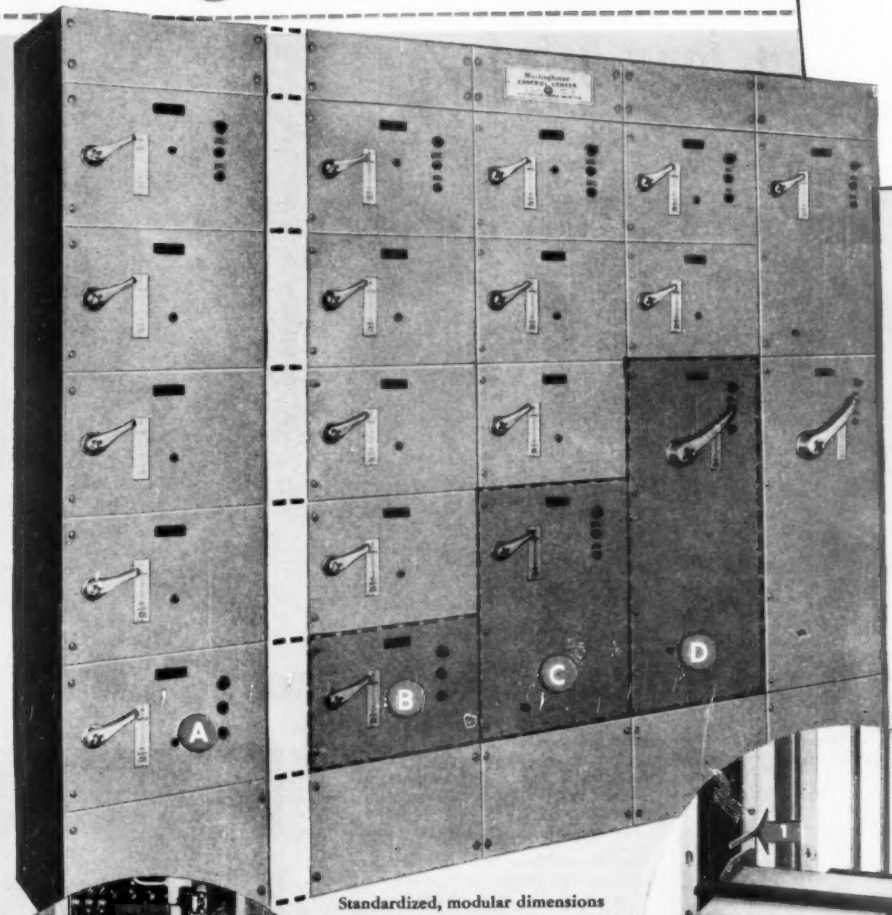


BRIDGE BRAKES · POWER AND DISTRIBUTION TRANSFORMERS · MOTORS · UNIT SUBSTATIONS

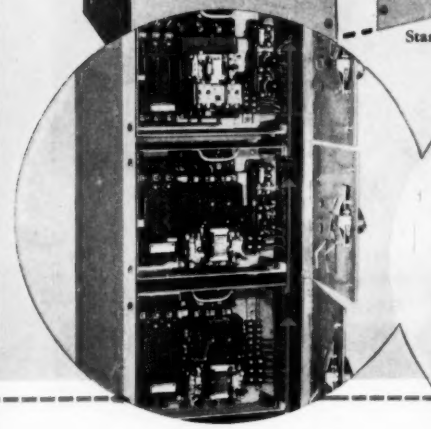
ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

YOU CAN BE **SURE**.. IF IT'S

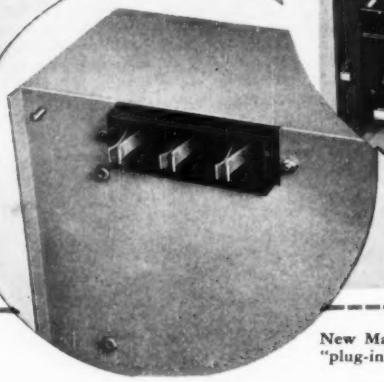
Westinghouse



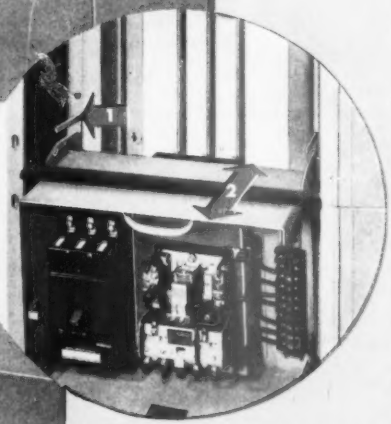
Standardized, modular dimensions



Large, vertical wiring trough



New Magna-Grip connectors for "plug-in" safety and convenience.



1. Guide rails assure perfect alignment of stabs
2. "Tilt-out" disconnect position

... the greatest advancement in "PLUG IN" control center design

The *NEW* Westinghouse CONTROL CENTER

Unusual operating benefits—advantages never before offered by centralized motor control equipment—are yours in the new Westinghouse Control Center. Credit them to this matchless combination of design features:

"TILT POSITION" DISCONNECT . . . for unmatched safety! Interlocking handles prevent opening of starter doors unless the breaker is in the "off" position. The starter may then be withdrawn to a self-supporting "tilt position" which disconnects it from the power bus. This means double protection for the operator!

NEW, MAGNA-GRIP "PLUG-IN" CONNECTORS . . . for unmatched operating simplicity! Magna-Grip "plug-in" connectors of high-quality, silver plated, alloy copper retains spring pressure even under extreme temperature conditions . . . combine safety with convenience in starter unit removal or replacement. They simply "plug-in" to the power bus to eliminate the danger attached to working on "hot" lines. Foolproof guide rails assure perfect alignment.

A CONTINUOUS VERTICAL WIRING TROUGH . . . for unmatched wiring convenience! Easily removable side baffles and support bars create a continuous wiring trough—unobstructed from top to bottom—to permit an easier, faster wiring job.

STANDARDIZED, MODULAR DIMENSIONS . . . for unmatched flexibility; vertical structures (A) of standard width and depth are 76″ or 90″ in height. Starter units (B, C, D) are 14″ high or in multiples of 14″. This modular design permits many combinations of starter units in single vertical structures . . . provides for simple interchangeability between large and small starter units.

The remarkable features of this new control center are the products of the same skillful engineering that has pioneered many major developments in centralized motor control equipment. It's another sound foundation for *sureness* when you specify Westinghouse. J-21538

GET THE COMPLETE STORY

Complete information on the new Westinghouse Control Center is contained in Booklet B-4213 just off the press. Ask your Westinghouse representative for a copy, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Westinghouse

CONTROL CENTERS

YOUNG

HEAT TRANSFER PRODUCTS

HEATING, COOLING AND AIR CONDITIONING PRODUCTS

Convectors • Unit heaters • Heating coils • Cooling coils • Air conditioning units • Evaporative condensers

AUTOMOTIVE PRODUCTS

Gas, gasoline, Diesel engine cooling radiators • Heat exchangers • Intercoolers • Oil coolers • Supercharger intercoolers

OIL FIELD, HEAVY INDUSTRIAL, MUNICIPAL & CHEMICAL PROCESS COOLING EQUIPMENT

Engine jacket water coolers • Oil coolers • Steam and natural gas condensers • Natural gas coolers • Evaporative coolers and condensers • "VAD" Vertical air discharge cooling and condensing units.

AERONAUTICAL PRODUCTS

Oil coolers • Supercharger intercoolers • Radiators • Heat exchangers • Valves • Regenerators

YOUNG RADIATOR CO.

General Offices: Dept. 809-M, Racine, Wisconsin
Plants at Racine, Wisconsin, and Mattoon, Illinois
Sales and Engineering Offices in All Principal Cities

THEY SAY AND DO

Taxes—and Death?

(A long time ago Benjamin Franklin wrote "in this world nothing is certain but death and taxes." Were he writing today, the order might well be reversed: Taxes—and economic death. We think this radio editorial from the Youngstown Sheet and Tube Company tells the story well.—Ed.)

How much do you pay in taxes? Your first thought in considering this question probably would be the taxes on your home; and second, your income tax, which are direct taxes; third, the taxes added to the purchase price of many items which you buy. These are easily recognized as tax payments; however, they represent but a small percentage of the taxes we, as consumers, really pay.

For instance, let us consider for a moment the taxes paid by Youngstown Sheet and Tube Company in one year. In 1948, the company paid out in local, state, and federal taxes $29,763,392. These charges included property taxes, old age benefit payments, unemployment taxes, and federal taxes on income. Dividing this total by 365 the number of days in one year gives us the average of $81,544 in tax payments for each day of 1948.

The employees of Sheet and Tube worked 54,303,332 hours during this same period. This figure divided into total tax payments gives us an average of 54.8 cents per man-hour worked. It was necessary, therefore, for Sheet and Tube operations to earn 54.8 cents each man-hour before it earned enough to purchase raw materials, new machinery, pay the wages and salaries of its employees, and pay a small return to investors in the shares of the company.

Let us assume that you have purchased an item largely made from steel, in which the steel requires 100 hours to produce. This one item of hidden taxes alone amounts to $54.80. This does not include the taxes levied against other manufacturers whose efforts are included in the same item.

Who pays these taxes in the final analysis? You do! We all do! They are paid by the ultimate consumer. This tax money is used to defray the expenses of our government.

Isn't it logical to assume that it is high time to insist on economy on the part of our legislators? You, as an individual, are thoroughly aware that you can't keep on spending a greater amount than your income. Your government is no different. Let us all start thinking about this problem and do something about it now.

Why Prices Are Where They Are

National Association of Manufacturers Research Department

Why do wholesale prices of manufactured goods today average about 85% above the 1939 level? High hourly wages are one reason.

American industry has seen hourly wages go up to more than 118% above the 1939 level, and at the same time has seen no important rise in output per man-hour to soften the heavy impact of this wage rise upon industrial costs and prices. As a result, industrial wage costs *per unit of production* have virtually doubled along with hourly wages.

For manufacturing as a whole, the output per man-hour is only about 10% higher than it was ten years years ago. There was good reason to hope that by now the figure would be 20 to 30% higher. Despite enormous capital outlays for new machinery and equipment, despite every effort toward maximum efficiency, this hope has not been realized.

Another situation that is widely misunderstood is that of profits. This is partly due to the use of wrong methods of measuring profits, partly to considerable lack of knowledge of the economic function of profits in our private competitive enterprise system.

The general public is not aware of the necessity for retaining a substantial amount of net income. In postwar years, industry has been forced to withhold more than 40% of profits from stockholders. This money has gone into new machinery and equipment and into inventory expansion (to meet heavy demand). And this amount has not been enough. Not by a long shot. Corporations have had to borrow heavily from banks and through bond sales. They have also been forced to sell equity shares where possible, and to draw on reserves.

Make Plans to Attend First Plant Maintenance Show

What good plant maintenance can do to cut costs will be dramatized at industry's first Plant Maintenance Show. It will be in Cleveland's Public Auditorium, Jan. 16-19, 1950.

For the first time—under one roof —you will be able to examine and compare the equipment and services that make low-cost production possible. That makes it a virtual "must" for the vice presidents in charge of production, the plant managers, the superintendents, the chief engineers —and the maintenance men—whose ultimate responsibility it is to select, operate, and maintain the equipment

why CRANE
DIAPHRAGM VALVE DESIGN
is Superior

WORKING PRESSURES:
150 Pounds
water, oil, air, or gas;
½ through 4-in. sizes
125 Pounds
water, oil, air, or gas;
6-in. size only
180 Deg. F.
max. temp.; all sizes

LONGER DIAPHRAGM SERVICE LIFE—Diaphragm is not subject to cutting, crushing, and rapid wear since it is used *only* to seal the bonnet; not for seating purposes.

POSITIVE SHUT-OFF in case of diaphragm failure. *This is an exclusive Crane safety feature.*

ACCURATE SEATING—Circular flat face disc with resilient neoprene seating surface gives tight closure—independently of diaphragm—on all fluids.

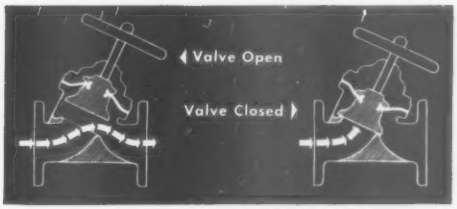
GREATER FLOW CAPACITY—Y-pattern body design gives closer approximation to straight-line flow, reduces resistance and pressure drop.

EASIER OPERATION—Less torque—fewer turns—needed to operate valves—especially in larger sizes.

PLAIN IRON OR NEOPRENE-LINED—Unlined valves will handle all common services. Neoprene-lined valves are recommended for fluids corrosive to iron but non-active chemically upon neoprene.

HOW IT WORKS

The Crane diaphragm performs one job *only*—sealing the bonnet against line fluids. The seating member is a separate circular flat face disc, firmly attached to the stem and joined to the diaphragm with a special leakproof connection. This independent seating arrangement permits positive shut-off of flow, even in case of diaphragm failure.

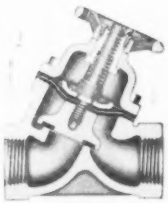


SEND FOR THIS NEW CIRCULAR

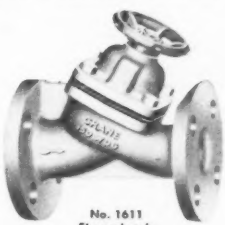
Contains complete information about these outstanding valves—including all essential specification data, service recommendations, and list prices. Ask your Crane Representative for your copy, or WRITE FOR CIRCULAR AD-1761. No obligation.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

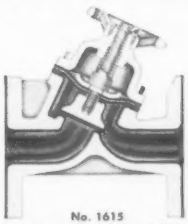
NOW AVAILABLE IN SIZES UP TO 6 INCHES



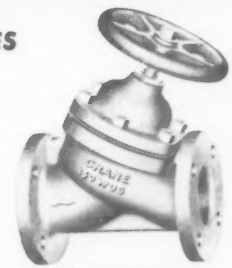
No. 1610
Screwed ends
½ to 2-in.



No. 1611
Flanged ends
½ to 6-in.



No. 1615
Neoprene-lined, Flanged ends
½ to 6-in.



2½, 3, 4, and 6-in. valves, Plain iron or Neoprene-lined, have rising, turning stem

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

"BUS-BOYS"..keep things moving.. but it's costly handling service in your plant

KEEPING things moving on production, assembly, processing or packaging lines can be done better, faster, and cheaper *mechanically* than manually.

Manual handling is held to a minimum—safety increased—operations coordinated — storage simplified — in modern plants equipped with Standard Conveyors.

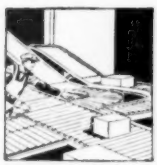
Conveyors of versatility and flexibility—for movement of light or heavy commodities — in manufacturing plants, warehouses, stores — are part of Standard's long experience record in conveyor engineering and building. Whether you need only a light, easy to carry length of conveyor — a portable, self-contained conveyor unit—or a complete engineered system—call on Standard for service.

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul 9, Minnesota
Sales and Service in Principal Cities

Standard GRAVITY & POWER CONVEYORS

Send for Standard's General Catalog —see how conveyors are used to best advantage in every field of industry. Ask for Bulletin FM-129.



ROLLER - BELT - SLAT - CHAIN CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

and services needed for efficient low-cost manufacturing.

There are technical sesisons, too. For the first time in industrial history, a series of meetings will be devoted exclusively to the subject of better plant maintenance. L. C. Morrow, co-editor of FACTORY, is general chairman of the show.

For advance registration cards, write the managers of the show, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. For hotel reservations, address the Plant Maintenance Show Housing Bureau, Cleveland Convention Bureau, Terminal Tower, Cleveland.

Survey Shows Most Mediators Are Pro-Labor

McGraw-Hill Washington News Bureau

You and the union are deadlocked over a wage increase demand. A strike threatens. In steps a government mediator. He tries to gain your confidence, wants to know how far you'll go to reach a settlement.

Before you go very far with him, perhaps you wonder: Is this guy on the union's side?

Employers often suspect a labor mediator of being partial to the union. This was especially true of federal conciliators before the Taft-Hartley law took conciliation out of the Labor Department and established the independent Federal Mediation and Conciliation Service.

A survey just completed on the attitudes of labor mediators indicates that management may be justified in any reservations it may have regarding particular mediators. It shows:

Three out of four mediators are pro-labor.

Less than one out of six is pro-management.

The survey, conducted by Irving R. Weschler, research assistant at the Institute of Industrial Relations of the University of California at Los Angeles, is part of a broader study by the institute on the mediation and arbitration process.

Back of the study was the feeling that not enough research has been conducted on the qualifications of mediators, although much attention has been given to the causes of strikes and, lately by the National Planning Association, to the cause of labor peace.

The broad objective of the study was to try to improve labor mediation by developing better ways of picking persons who will make good mediators.

More than 200 letters were sent to mediators for the federal government, the states of New York and California, and a few others.

There were responses from 143 mediators who, on the basis of ability and past performance, were classified by their colleagues as "good," "poor," or "other." Forty-six fell into the "good" category, 51

PUSH... and electrical service is restored with BullDog *Pushmatic*

THAT'S ALL there is to it! A simple push of the finger makes or breaks the circuit. No resetting manually when the circuit is broken by short or overload. Just PUSH —and service is restored.

Pushmatic is compact, sturdy, simple . . . the most versatile and flexible unit available today. It will meet every new or changing load condition.

And *Pushmatic* units are easy to install! There are no complicated group mountings . . . individual single-pole units make additions and changes a simple matter.

There are four types of *Pushmatics:* THERMAL ONLY, THERMAL-MAGNETIC, or either of these types with AMBIENT COMPENSATING FEATURES. All are identical in size and contour, in ratings of 15, 20, 30, 40, and 50 amperes, 120 V., 1 pole, or 120-240 V., 2 poles, AC. All are interchangeable for rating and type.

Write today for *Pushmatic* Bulletin #493. This descriptive bulletin contains complete information and prices on BullDog Electri-Centers and the new *Pushmatic.*

Only *Pushmatic* Electri-Centers provide push-button control, automatic protection!

REVOLUTIONARY, new *Pushmatic* ELECTRI-CENTERS provide electrical control centers that are the last word in efficiency and protection.

They are attractive, compact, simple . . . easy to wire. There's plenty of gutter room even in the smallest cabinets.

With Electri-Centers there are no fuses to buy, no complicated operations or installation techniques to remember. You get versatility and adaptability, ease of installation and operation *never before obtainable in any panelboard.*

See the new ELECTRI-CENTERS at first opportunity, or write today for *Pushmatic* Bulletin #493.

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN — FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULL DOG
HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

....a new, fast copy system

The BW Process makes it possible for you to produce sharp, clear, black-on-white prints directly from your originals without transcribing, cutting stencils, making carbons or other costly intermediate steps. All that is required to effect this tremendous economy in time and materials is the use of inexpensive translucent paper for the originals. From these, Bruning Whiteprints can be produced in a matter of seconds, on any Bruning Whiteprinter. Any girl in your office can do it.

BRUNING BW WHITEPRINTERS have many advantages:

Many BW uses. Orders, invoices, reports, financial statements, sales presentations, letters, legal forms, engineering drawings, and other documents . . . written, typed, printed or drawn . . . can be duplicated in seconds, without the chance of error in transcription, and with all original signatures and notations faithfully reproduced.

Prints in seconds. When you want copies in a hurry there is no time lost making transcriptions, cutting stencils, orother intermediate steps. BW Prints are produced in seconds, dry and ready for instant use.

A wide variety of BW prints. BW machines make prints from post card size up to 42 inches wide and of any length. BW paper is available in light, medium and card weights, white or tinted, in rolls or cut sheets of many sizes.

Very clean. There are no messy carbons or printing inks to handle . . . no harmful or smelly chemicals. The BW process gives you perfect prints in one fast operation . . . virtually autbmatically.

Inexpensive. You save money with the BW process. The small cost of BW prints is returned to you many times over in the time and labor saved.

***Send today* for full information** about this amazing new office copying system. Ask us for our file of literature and samples. You will see for yourself that the BW Process is the modern answer to fast copying and greater economies. No obligation.

Charles Bruning Company, Inc.

4706-18 West Montrose Avenue, Chicago 41, Ill.

New York · Newark · Boston · Pittsburgh · Chicago · Cleveland · St. Louis
Milwaukee · Kansas City, Mo. · Houston · Los Angeles · San Francisco · Seattle

Other Bruning products you should know about — Drafting Machines Sensitized Papers & Cloth • Tracing Papers • Erasing Machines • Drafting Room Furniture • Slide Rules • Surveying Instruments • and many other products.

THEY SAY AND DO *(Continued)*

were rated as "poor," and 46 fell into the "other" group.

The mediators were given four tests: (1) intelligence, (2) personality, (3) knowledge of pertinent facts and (4) impartiality.

We are concerned here with the mediators' "impartiality."

The impartiality of a labor mediator was judged by his answers to 11 of 45 questions in a quiz called the "Labor Information Inventory."

Thirty-four questions were factual and intended to rate the knowledge of the mediator.

For example, one question was whether the Little Steel formula was used during the war to determine wage increases or to establish union security.

Another asked whether industry-wide bargaining is conducted in the coal or the automobile industry.

Still another asked whether the chairman of the Senate Labor Committee is Sen. Thomas or Sen. Murray.

The other eleven questions, not distinguished in any way from the others, were what are described as "weighted nonfactual error-choice" items. From the answer to these, it was considered possible to estimate a person's general attitude toward labor or management.

These "loaded" questions asked the mediator to choose between two possible answers. Sometimes both answers were wrong, so that by choosing one the mediator might indicate a pro-labor bias; by choosing the other, a pro-management bias.

An example of this type of question: "During April of 1948, the coal and meat strikes increased the number of work days lost through voluntary stoppage to (a) 10-million work days; (b) 6-million work days."

The correct answer is 8-million work days. Presumably, then, if the mediator guessed 10-million, he reflected a pro-management partiality; if he guessed 6-million, he would be leaning toward the union side.

Some questions gave the mediator a choice between one wrong and one correct answer. Picking the correct answer would help build up a case of neutrality for the mediator.

An example: "During the strike wave of April 1948, the per cent of estimated working time lost was (a) 1.1%; (b) 2.2%." Correct answer: 1.1%.

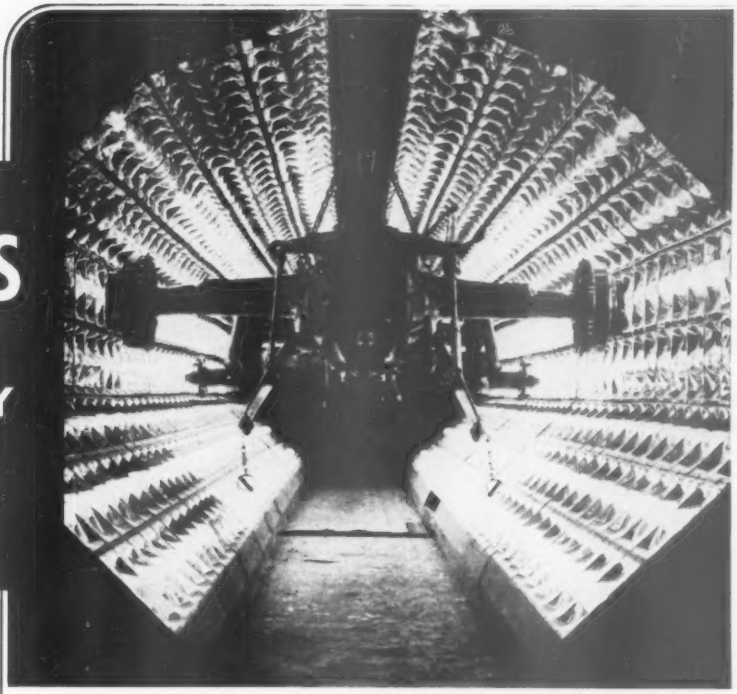
Answers to still other questions were not based on facts. Rather, they reflected judgment on a highly controversial issue, so that by picking one side or the other, the mediator indicated his attitude.

For example, this question: "After one year of operation, the Taft-Hartley Act has resulted in a trend (a) toward successful management defense of its rights and prerogatives; (b) toward weakening the security of even the largest unions."

Another: "The 1948 increase in the

SAVES FOR INDUSTRY

- TIME
- SPACE
- MONEY



EVENRAY INSTALLATION AIDS STREAMLINED PRODUCTION. Harry Ferguson, Inc., Detroit, utilizes a 64-foot Fostoria Evenray paint baking oven with a capacity of 250 assemblies in eight hours—to keep pace with the new assembly plant's production basis of a completed farm tractor every 115 seconds.

FOSTORIA EVENRAY INFRA-RED

MORE THAN 6000 PLANTS ARE CUTTING COSTS WITH THESE EVENRAY ADVANTAGES

- Lowest Unit Operating Cost
- Most Uniform Coverage
- Maximum Temperature Range
- Maximum Energy Utilization
- Greatest Flexibility
- Approved Electrical Construction

Listed under Re-examination Service of Underwriters' Laboratories, Inc.

More than 6000 industrial users can testify to the superiority of Fostoria Evenray Infra-red Systems for finish baking and many other product heating operations. Fostoria's thorough knowledge of Infra-red applications . . . the painstaking research and pilot-testing of individual installations . . . the outstanding ability and leadership of Fostoria engineers—all combine to take full advantage of Infra-red's inherent time and money-saving efficiency. That's why Fostoria Evenray out-performs any other Infra-red equipment on the market today, *by actual test!* It *pays* to use the *best* in Infra-red. Request a Fostoria recommendation, today.

WRITE today, for free brochure describing the Infra-red process and Evenray advantages. Tell us your particular problem for our recommendation. No obligation.

EVENRAY SYSTEM Reg. U. S. Pat. Off.

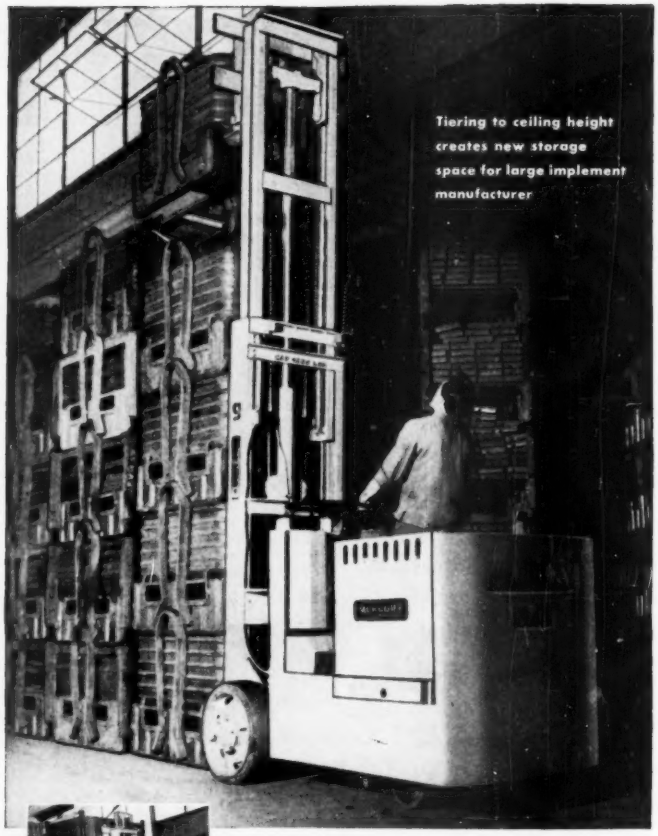
fostoria

FOR BAKING • DRYING • PREHEATING • DEHYDRATING

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

Oldest and Largest Manufacturers of Industrial Infra-red Ovens

5 Times Greater Inventory handled with MERCURY fork trucks



Mercury "Yak" Fork Truck quickly stacks 4000 lb. load

FIVE times greater inventory handled with no appreciable increase in plant facilities—that's the record established when a fleet of Mercury Fork Trucks replaced former handling methods for this large implement manufacturer.

Tiering to ceiling height created new storage space . . . unit handling of 2500-4000 lb. loads expedited materials from receiving, through processing to shipping. It'll pay you to consult Mercury's 38 years' handling experience. Ask a Mercury Sales Engineer to call.

FREE: NEW 52 PAGE CATALOG
Illustrates and describes complete Mercury line of Tractors, Trailers, Lift Trucks. Request your copy on company letterhead, today.

Take it up with MERCURY
38 years' handling experience

THE MERCURY MANUFACTURING COMPANY
4110 SOUTH HALSTED STREET, CHICAGO 9, ILLINOIS

TRACTORS • TRAILERS • LIFT TRUCKS

price of steel was (a) proportional to the union's wage gains; (b) comparatively greater than the union's wage gains."

Sixty-four mediators were scored on the impartiality test. Forty-six won "pro-labor" tags. Ten turned out to be pro-management. Eight landed in the neutral zone.

A break down of how the "good" and "poor" mediators scored may be disconcerting to employers. Of the 21 "good" mediators, more than half —13, to be exact—were found to be pro-labor. One was pro-management.

Half of the 10 pro-management mediators were rated as "poor" ones.

Here is a table of the results:

	Pro-Management	Neutral	Pro-Labor	Total
Good mediators	1	7	13	21
Poor mediators	5	0	14	19
Other	4	1	19	24
	10	8	46	64

The Institute admits that its study is merely exploratory, but hopes that it may lead to further research into the personality requirements of labor mediators.

It considers personal interviews valuable in obtaining clews as to how a candidate for a mediation post might react in real-life mediation situations.

One suggestion is a series of interviews by labor and management leaders. They are the ones who create the situation into which the mediator must fit. Therefore, it is felt that they might be better equipped to judge whether a person meets the specifications for a "good" mediator.

The institute hopes that additional work in this field may develop useful information which, when applied, will help improve our labor-management relations.

Anniversary Bonus to Employees

An extra week's pay is going to each of 4000 employees of the Scott Paper Company during its 70th anniversary celebration. Scott says it's in recognition of "the quality of their work, basis of the company's growth."

Four Points for Management Action

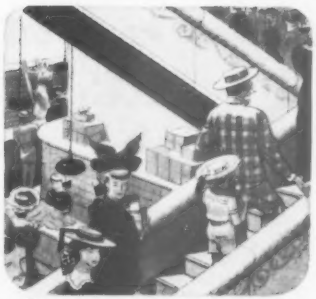
FRED RUDGE, Fred Rudge, Inc., speaking before Pan American Engineers Congress, Rio De Janeiro

. Many businesses in the U.S. are going through a leveling-off period. Certain consumer wants have been temporarily satisfied; supply lines, almost empty since war's end, are now filled. Hence, sales are down; and in some fields of activity, people have been laid off.

These laid-off people still have wives to take care of and children to

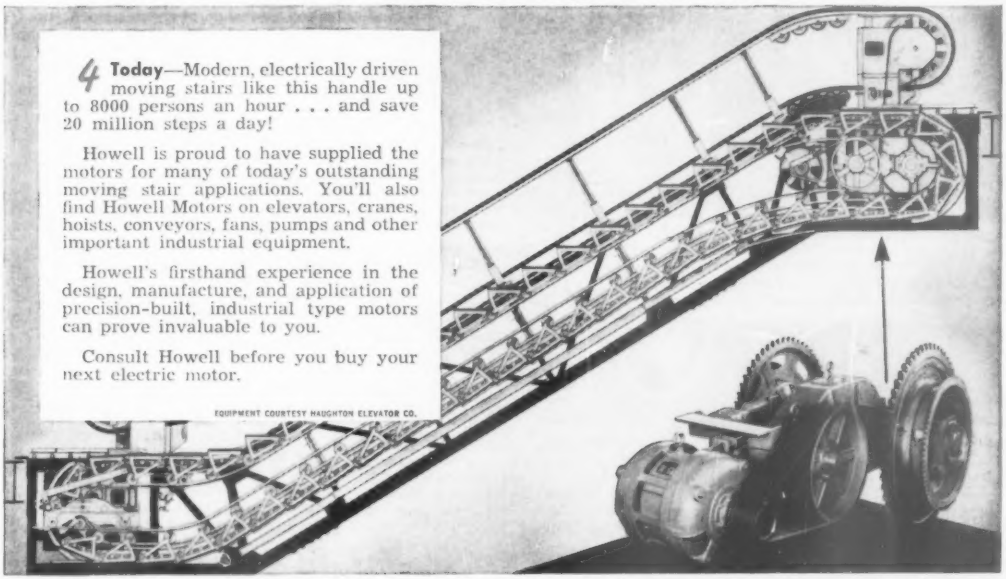
1 **1800**—For centuries, steps were man's main means of going up. First came the ladder; later, crude steps formed stairways. Even so, man still had to ascend a step at a time under his own power.

2 **1875**—Stairways took all forms—straight, spiral, plain and ornate. Then, one Samuel Gray patented an "elevator and moving stairway." Though impractical, his idea set others to work.



3 **1901**—The forerunner of today's moving stairs was installed in a New York store. By 1915, Howell "Red Band" Electric Motors arrived. Soon, these rugged motors were widely applied.

SAVED...20 MILLION STEPS A DAY!



4 **Today**—Modern, electrically driven moving stairs like this handle up to 8000 persons an hour . . . and save 20 million steps a day!

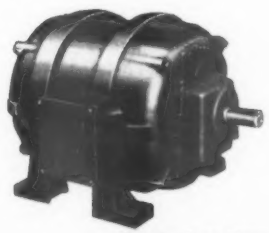
Howell is proud to have supplied the motors for many of today's outstanding moving stair applications. You'll also find Howell Motors on elevators, cranes, hoists, conveyors, fans, pumps and other important industrial equipment.

Howell's firsthand experience in the design, manufacture, and application of precision-built, industrial type motors can prove invaluable to you.

Consult Howell before you buy your next electric motor.

EQUIPMENT COURTESY HAUGHTON ELEVATOR CO.

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.



Elevator Type Motor

HOWELL MOTORS

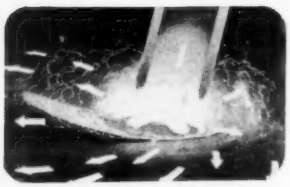
HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

How can you cut costs with ARC WELDING?

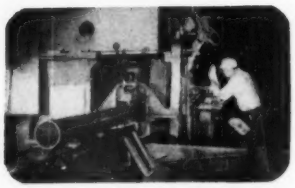
See this film and find out!



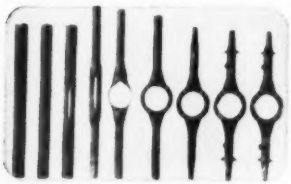
1. **"ARC WELDING AT WORK"**, a 16mm full-color motion picture produced by General Electric, has a message for every cost-conscious executive who may be overlooking opportunities for arc welding in his own plant. A vivid animated treatment (above)...

2...makes the technical parts of this film highly palatable. New uses for arc welding are suggested throughout. Welded building construction, for example (above) is shown to be efficient and economical. And as outdoor pressure vessels and piping...

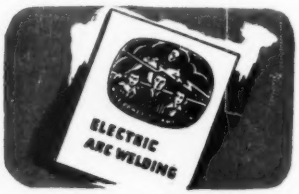
3...become larger and more complicated the value of modern arc welding becomes more and more evident. In fabricating a consumer product like kitchen sinks (above), the film shows how high-quality welding adds extra eye appeal and salability.



4. As exemplified in this tubing machine (above) automatic arc welding is shown to offer almost limitless opportunities. Here, precise heat control is the big factor. Also, arc welding provides highly ductile joints, a fabricating requirement for...



5...this automotive rear-axle housing (above). These welded joints withstand ten severe stretching and swaging operations, with no sign of failure! Because we believe you can profit from a wider knowledge of arc welding, let us send you this...



6. **ARC WELDING MANUAL... FREE!** It has all the data you need to make an intelligent decision on this vital subject. [The complete program consists of a 30-minute film, manual and "highlights" booklets.] MAIL THE COUPON TODAY!

FREE
to business management!

General Electric Co., Section A684-13
Schenectady 5, N. Y.

Attach to your business letterhead

☐ Please send me a complimentary copy of the G-E Arc Welding Manual (GES-3491). (Extra copies at regular manual price — $1.25.)

☐ I'd like to borrow a 16mm print of the color film from my nearest G-E office.

Name _____ Title _____

Company _____

Street _____

City _____ State _____

GENERAL ELECTRIC

feed. You can figure out the answer for yourself.

These people either have got to be thoroughly sold on the virtues of a system based on freedom and initiative—with all of its admitted and currently obvious faults—or they will become a prey to all of the utopian "pie-in-the-sky" isms whose ranks are always recruited from among the malcontents, and eventually they will demand the election of lawmakers who promise them a different business system.

What should management do?

1. Recognize that there is a problem. Too often company management is content to try to do a good job of finance, production, research, and sales alone. Management needs to recognize that its future depends not only upon company achievements within our present economic structure, but upon what happens as well to the economic structure itself. Every company should devote time and some of its best brains to maintaining and strengthening that economic structure through building understanding, and through offering constructive leadership.

2. Provide positive leadership. There are three levels of action:

a. Provide within the company itself a practical, workable maximum of the things that contribute to employee security and job satisfaction. Management must not wait to see how government is going to provide added security before it makes active plans to do the best it can, on its own. Nor can management safely wait to improve on-the-job-satisfaction until unions force a greater degree of interest in human relations problems.

b. Promote, within the company's plant communities, privately sponsored activities that provide greater security and potentially increased economic development. There are literally hundreds of ways—largely untapped to date—in which the talent of management can be put behind the task of making our communities better politically, morally, spiritually, and economically.

c. Work for those things which make the private business system pay off for employee, stockholder and consumer alike. Among others:

—increased productivity.
—higher quality.
—lower cost.
—saving on the part individuals.
—investment in new plant and equipment.

3. Face the problem of communications. When a company recognizes that it is worth while to build understanding of our present business system, it then needs to apply the same

$HORT CUT$

BY CHIEF BLACKHAWK

This Motorized Hydraulic Pump Gives You Greater Speed, Ease, Efficiency

Replace Hand Pumps With the Low-Cost P-182 Portable Unit

Startling savings are being rolled up by hundreds now using this P-182 "Porto-Power" Pump. It offers major advantages over hand-pumping of hydraulic rams on production and maintenance jobs. Its reduction of fatigue is dramatic.

Carry it anywhere

The portable P-182 is electrically-driven and packs its motor, oil reservoir, valves and pump all in one slick unit. It serves one or more rams — delivers up to 10,000 p.s.i.

Operators of hydraulic equipment become more accurate and they can work more continuously . . . piling up output at a surprising clip. Some users report tripling their former results.

Ask for literature

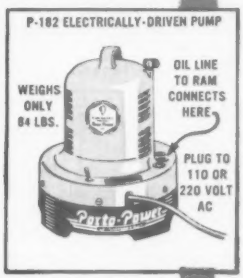
If you now own or are buying Blackhawk *hand-operated* "Porto-Power" hydraulic units, you will immediately want to investigate the extra benefits you get by motorizing this equipment. Check all of your other hand-operated hydraulic devices, too! Many can be made much more productive by the P-182 pump.

There's no engineering or installation problem. Write Blackhawk today or ask your Industrial Supply Distributor for literature . . . then get this inexpensive P-182 pump on the job to cut your costs and zip up the work.

A Product of Blackhawk Mfg. Co., Dept. P-27129, Milwaukee 1, Wis.

MOTORIZE YOUR "PORTO-POWER" BENCH PRESSES! This combination is far less costly than presses of traditional design. And the portable hydraulic equipment can be used for other purposes, too! (Write for FREE BLUEPRINTS on how to build a low-cost press for 20-ton or 50-ton rams).

FOR MAINTENANCE, TOO —The P-182 pump is easily carried anywhere. Above — it operates a "Porto-Power" toe-lift combination.



A COMPLETE PACKAGE! The idea of a practical, portable, self-contained, motor-driven hydraulic pump is an exclusive Blackhawk development.

BLACKHAWK®

• HYDRAULIC JACKS • PORTO POWER • PIPE BENDERS • WRENCHES •

These Coolers meet every demand

MODERN DESIGN

ALWAYS HYGIENIC

IT doesn't matter what you seek in an electric cooler, you'll find it in a Halsey Taylor! They are not only modern in mechanical improvements but they bring a welcome freedom from servicing annoyances. Coolers for remote installations, combinations for drinking use, or Halsey Taylor fountains for plant or office use. Get our catalog.

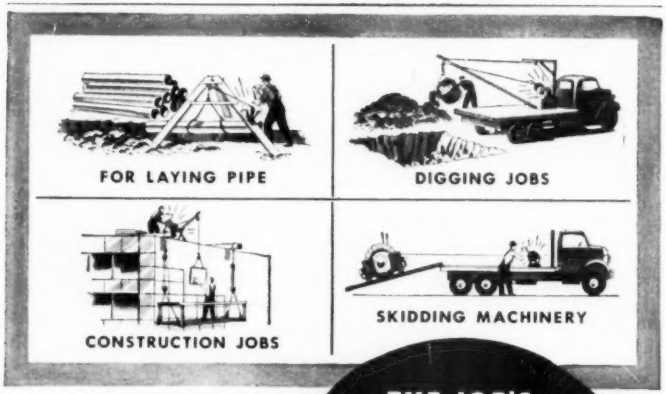
THE HALSEY W. TAYLOR CO.
Warren, Ohio

MODELS TO SUIT YOUR NEEDS

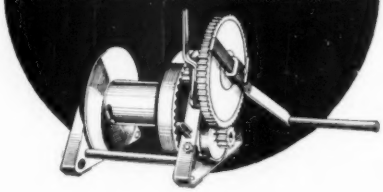
FOR SHOP OR OFFICE

F-5

Halsey Taylor
COOLER FOUNTAINS



THE JOB'S A CINCH... WITH
HANDIWINCH



9151

One man lifts or pulls loads up to 10,000 lbs. with the AMERICAN HANDIWINCH. Simple, rugged, weighs only 95 lbs. Carries easily, sets up anywhere. Cut steel gears, two gear ratios. Has demountable tail yoke. Triple-width drum model also available. Sold everywhere; made by AMERICAN HOIST AND DERRICK CO., ST. PAUL 1, MINNESOTA.

ALSO MAKERS OF GENUINE CROSBY CLIPS AND AMERICAN BLOCKS AND SHEAVES.

sound principles to this area that it customarily follows when it faces other challenges.

Begin with research, and find out areas of strength and areas of weakness. What do people know about our economic system? What do they like and dislike about it—and why? On the basis of the research, a company can map out a long-range program, select men able to cope with the demands, and provide the budget for a satisfactory job.

The next step is the formulation of company philosophy and policy, which needs to be spelled out in terms that people understand. Our own people—and people all over the world—have a great respect for the products of our industrial system, because business has done a good job of selling these products. They will develop respect for business as a prime factor in providing a fuller way of life only as management makes the fact known that business' objectives and the aspirations of the people for a better life are largely one and the same.

4. Encourage participation. A free business system, which provides a maximum of individual opportunity, is about as good as the interest and participation of millions of workers allows it to be.

As our production-line methods become more routine and standardized, therefore, it is more important than ever that management find opportunities for the individual to feel he is really participating, and not just a cog in the wheel.

Again, opportunities to do so are legion, varying from simple suggestion systems to basic moves such as multiple-management operation.

Workers Get 51st Dividend

Over 6200 employees of Minnesota Mining & Manufacturing Company recently got $253,897 as their share of the company's third-quarter profits. The workers are employed at 27 plants and offices in 15 states. This was their 51st consecutive quarterly payment.

Free Competition Is Essential to Success

CRAWFORD H. GREENEWALT, president, E. I. du Pont de Nemours and Company, Inc., at a meeting of Wilmington (Del.) service clubs

"We dare not hobble the willingness of a business to venture by refusing it the fruits of its success or by holding out the doubtful privilege of government regulation when that success has been achieved.

"Small business must be encouraged to grow larger. And large business, capable of taking the great risks involved in the difficult industrial tasks, must not have its sinews weakened by political attrition.

"Competition is a prod that keeps us continually on our toes. We think

Another outstanding Fenestra Panel job!

One of the twin recreation buildings for Endicott-Johnson Corporation, Endicott and Johnson City, New York. Each identical building contains 12,450 sq. ft. of insulated walls and 51,750 sq. ft. of acoustically-treated, cellular building panel floors and roofs—all Fenestra. Architect: A. T. Lacey & Sons, Binghamton, N. Y. Contractor: Vincent J. Smith, Inc., Binghamton, N. Y.

. . . in our 25th year of light-gage steel fabrication

You learn a lot about sheet steel fabrication in 25 years.

Steel roof deck, originated by Fenestra* Holorib in 1924, began the large scale commercial use of sheet steel as a building material. Holorib's strong pyramidal rib, full support for insulation, full last rib to eliminate asphalt leakage, telescoping end laps and interlocking side laps are features which construction men readily appreciated.

You prove a lot in 25 years, too. Holorib roofs laid down in 1924 are still good roofs—living up to their promises.

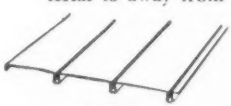
Holorib's success led us to develop new ideas, to the perfection of cellular building panels for floors, walls, ceiling and roofs—the entire enclosure.

Fenestra developed panel types D and AD with high strength-weight ratios. A maximum of material is away from the neutral axis, giving full support for fill or insulating materials, enabling you to keep quantities of those materials to a minimum. Acoustically treated, through Fenestra's perforating and adding of a sound element, they provide economical combined ceilings and roofs for schoolrooms, auditoriums and gymnasiums.

Fenestra's type C panel provides a 3-inch insulated wall equivalent to a 12-inch brick wall. These panels may be erected in vertical or horizontal position.

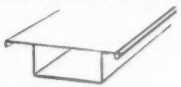
Fenestra Metal Building Panels are designed to reduce dead loads. They save construction time and money. Laid in long spans, they fit together easily, speedily. Fenestra floors enable other trades to move in faster—Fenestra walls speed enclosure, permit earlier building occupation.

Fenestra's fund of practical knowledge on modern building technology is ready for you to tap. Get the facts. Mail the coupon.

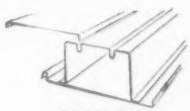


HOLORIB

TYPE C



TYPE D



TYPE AD

*Trademark

Fenestra

METAL BUILDING PANELS

ROOFS · WALLS · FLOORS

DETROIT STEEL PRODUCTS COMPANY
Building Panels Division
Dept. FM-12, 2266 E. Grand Boulevard
Detroit 11, Michigan

☐ Please have an engineering representative call.

☐ Please send me, without obligation, information on Fenestra Building Panels.

Name _____

Company _____

Address _____

Unique Fenwal Thermoswitch* Thermostat Amazes Heating Experts by Performing the "Impossible!"

YES, manufacturers are discovering the remarkable line of Fenwal THERMOSWITCH* units can give them help they thought mechanically impossible! A coal furnace manufacturer, for instance, found the Fenwal THERMOSWITCH* the *only* thermostat able to solve the problem of automatic grate shaking. Ordinary thermostats either could not stand up under punishment . . . or were too slow in operation.

You, too, can benefit from this unbeatable THERMOSWITCH* performance. It has countless applications, does away with costly control equipment, opens up new forms of precision-control in all types of manufacturing processes. Low upkeep cost, too. The THERMOSWITCH* is accurate, rugged and simply constructed, with mechanism fully enclosed by the temperature-sensitive shell. Investigate it now!

FENWAL INCORPORATED
23 Pleasant St., Ashland, Mass.
Temperature Control Engineers

Fenwal

WRITE FOR BULLETIN ON

THERMOSWITCH*

*Reg. U. S. Pat. Off.

The Precision Thermostat For Temperature Control and Detection

SENSITIVE... *but only to heat*

we are stronger with it, weaker without it.

"Our present size and success have not come about by absorbing competitors. They have come through the new products and processes developed in our laboratories."

To prove this point, Mr. Greenewalt called attention to the company's investment of $43 million in dyestuff development before profits offset losses.

He also described the expenditure of $27 million on nylon before the company could sell the first pound from a commercial unit.

Nylon and dyestuffs proved to be profitable not only for DuPont stockholders, he said, but also for the thousands of men and women who got jobs that never existed before. Not to mention the millions of consumers whose standard of living was raised by each success.

Town's Industry "Teaches" Its Teachers

School children of New Britain, Conn., recently enjoyed an unscheduled holiday. Industry and education in the town had "drifted too far apart." So eight manufacturing concerns spend one day as hosts to about 450 school employees, mostly teachers. Talks were given by top management on personnel matters, sales, the economics of industry, and the part that manufacturing plays in New Britain.

The idea was to explain industry to the educators from management's point of view. At the same time, management could gain a better understanding of the city's educational system.

New Britain's superintendent of schools said he believed that the average teacher had been, up to this time, more exposed to the labor side of labor-management relations. This attempt to let management tell its story should, he said, make for more balanced discussion of modern problems in the classroom.

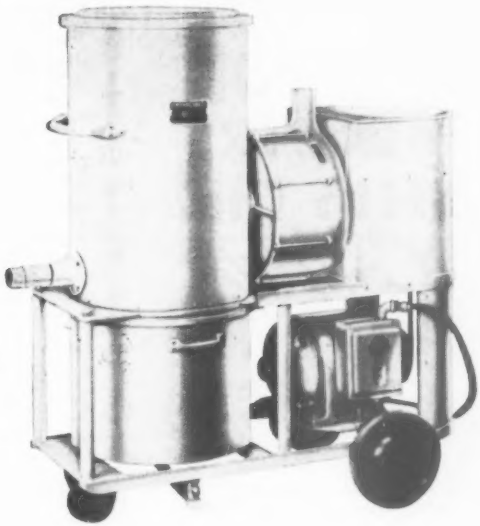
Prepare to Meet Europe's Competition

JAMES F. LINCOLN, president, Lincoln Electric Company. (From an interview published in the Cleveland Plain Dealer.)

"If we were to send 10,000 American production experts to England and the European continent for one year, those countries could shut down every industrial plant in the United States."

Mr. Lincoln voiced this startling opinion after a two-week tour of industrial concerns in England, Holland, Belgium, and France. The reason he gave was Europe's low wage level. So far, the seller's market being enjoyed there and the lack of American know-how in production methods has kept them from flooding

"that's my machine! ... for better plant cleaning"



• These extra heavy-duty INVINCIBLE VACUUM CLEANERS are achieving *thorough* removal of industrial dust and dirt in less time with less labor, and therefore at less cost. Even hard-to-reach spots are readily cleaned by these versatile machines and their handy attachment tools. Such complete cleaning insures better working conditions for your men, and less "dust-damage" to your equipment or product ... INVINCIBLES are also used to reclaim or remove scores of industrial materials ... In either type of service, INVINCIBLES quickly pay for themselves.

ILLUSTRATED is Model 809-B. This 5 H.P. unit is extra rugged—suitable for continuous use under the heaviest requirements. Similar in appearance is Model 900, a 3 H.P. machine, ideal on production or maintenance applications requiring an intermediate size unit.

FREE BOOKLET
describes the complete line and varied applications of Invincible machines.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

YOUR INDUSTRY NEEDS THIS *Complete* SHIPPING SERVICE

Over a century of shipping experience and constant improvement are back of nation-wide RAILWAY EXPRESS, the world's largest coordinated rail-air transportation service. It's your **complete, all-purpose** facility for every size and type of shipment.

When you use RAILWAY EXPRESS, you deal with **one** responsible carrier. **One single charge** covers everything you need for satisfactory shipping. Specify RAILWAY EXPRESS for **all** your shipping requirements.

***Complete* Service for a SINGLE CHARGE means**

Pick-up and delivery in all cities and principal towns . . . Fast, uninterrupted rail or air service . . . Automatic valuation coverage up to $50 or 50¢ per pound . . . Two receipts — one to the shipper, the other from the consignee . . . and many other advantages it will pay you to investigate.

RAILWAY EXPRESS AGENCY

NATION-WIDE RAIL-AIR SERVICE

U.S. markets. But these factors are bound to disappear in time.

"To meet this competition, we have three alternatives. Either we must raise tariff barriers, reduce wage levels here until the differential largely disappears or maintain present wage levels and increase the productivity per man-hour in our industries.

"The last of these three is, of course, the most logical and will result in maximum happiness for all concerned. It is the answer of how to pay high wages and maintain low prices."

What You Can Do in the Fight for Freedom

EARL BUNTING, managing director of NAM, speaking to Chattanooga (Tenn.) Manufacturers Association

"It seems to me that of all the leaders in American communities, the business man bears the greatest responsibility for building freedom from the ground up—building good national government out of good local government.

"In brief, many people want the government to support them with funds obtained by taxing away the livelihood and opportunities of the vast majority of Americans, who prefer to earn their own living and lead their own lives.

"If you—if every business man does not *now* make it his personal responsibility to lead—where informed, responsible leadership counts most—where you live and where the American people live and earn their living—it is you, your fellow citizens, your fellow workers in the factory and the office—who will all pull their hearts out on the medieval oars of an impersonal, slave-propelled ship of state. It used to be called 'serfdom.' Now it is called 'welfare.'

"As a citizen and as a business man, I believe that every manufacturer—whether foreman or factory head—and every business man has a special responsibility to his own community. He owes it every ounce of leadership he possesses or can develop. He owes this forthright leadership in the field of public affairs as well as economics.

"This is no time for ducking issues and giving ground—in a world now bullied and knocked flat by dictatorships and almost equally monopolistic forms of socialism—which regiment nations in the name of welfare—which strip labor of its rights and fair rewards under the false-face of labor's own government.

"The front line of the battle for freedom—for individual rights, for personal, responsible action—today lies in good civic leadership throughout every American community.

"It lies squarely at your doorstep."

REDUCE COSTLY TANK MAINTENANCE AND OUT-OF-SERVICE TIME DUE TO INTERIOR RUST AND CORROSION

Cathodic Protection—either alone or in conjunction with paint—is modern, effective and economical. Electro Rust-Proofing offers the technical skill and experience of thousands of installations to give practical answers to your problems. Write today, without obligation, for detailed information.

E-12

ELECTRO RUST-PROOFING CORPORATION (N.J.)

BELLEVILLE 9, NEW JERSEY

REPRESENTED IN PRINCIPAL CITIES

Goes to the SOURCE of BAD SMELLS!

F&E DISINFECTS WHILE DEODORIZING

F & E kills many types of bacteria which cause disgusting odors. At the same time it transforms noxious vapors into a pleasant agreeable atmosphere tinged with the invigorating scent of eucalyptus.

USE F & E SOLUTION around toilets and urinals . . . for flushing garbage receptacles and sick room accessories . . . for dressing room benches and lockers . . . wherever agreeable, high-speed deodorization is required.

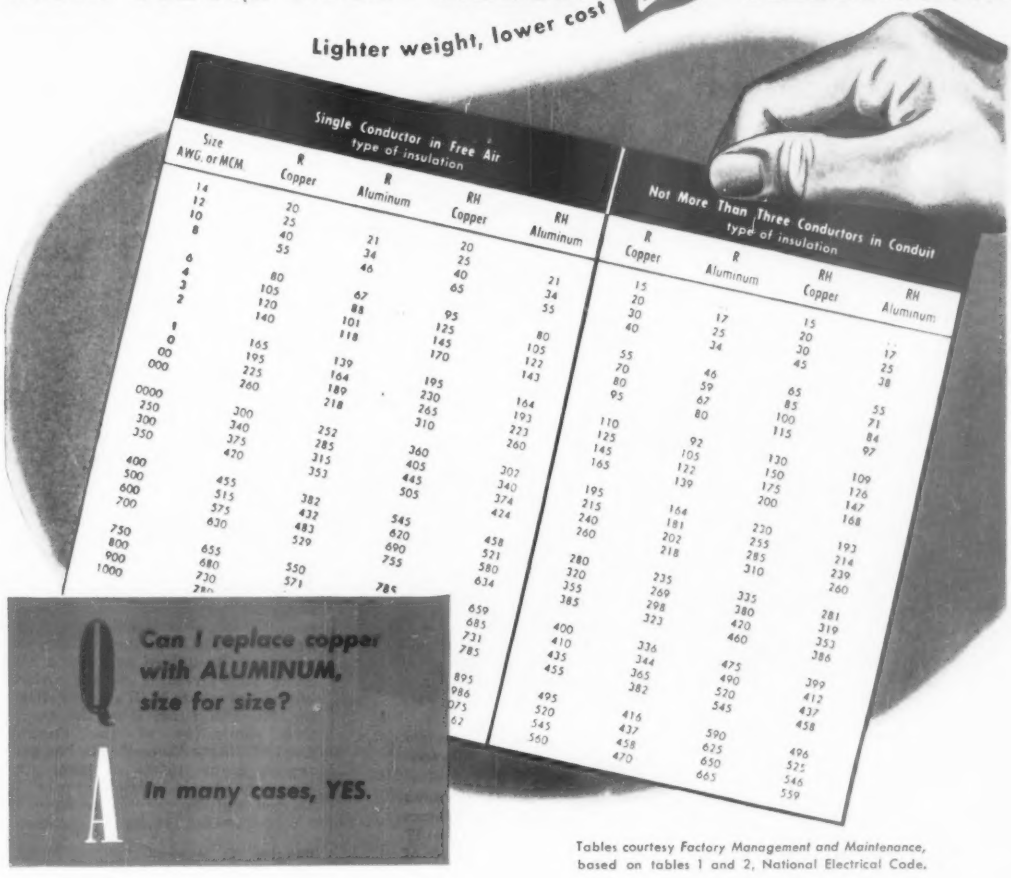
Write for Folder FE-F745

The C. B. DOLGE CO.

WESTPORT, CONNECTICUT

MORE NEWS ABOUT ALCOA EC ALUMINUM on the job Today

Lighter weight, lower cost



Q Can I replace copper with ALUMINUM, size for size?

A In many cases, YES.

Tables courtesy *Factory Management and Maintenance*, based on tables 1 and 2, National Electrical Code.

Check the current ratings! You'll see that wire and cable with Alcoa E.C.* Aluminum conductor with type RH Insulation can replace copper with type R Insulation. This gives you superior insulation plus aluminum's lighter weight and low cost.

Mechanical, soldered or welded joints are used. Fittings are supplied by reliable manufacturers.

Alcoa makes light, strong, conductive E.C. Aluminum; leading wire manufacturers draw, strand and insulate it, and sell it under their own trademarks. Investigate the savings it can yield on a single job!

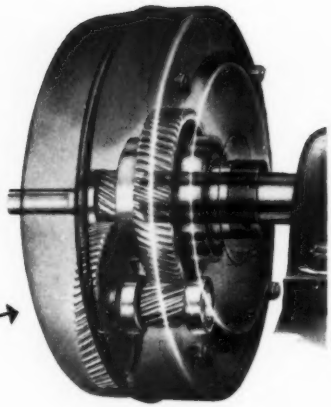
Ask your wire supplier, or write ALUMINUM COMPANY OF AMERICA, 1900M Gulf Building, Pittsburgh 19, Penna.

*E.C.: *Electrical Conductor* Aluminum

ALCOA EC ALUMINUM

FOR ELECTRIC WIRE AND CABLE

how
AMERICAN
REDUCTION DRIVES
give you
SLOW SPEEDS
at LESS COST!



Here is a completely STANDARD reduction drive that can transform your special, slow-speed problems into simple, efficient high-speed installations . . . using STANDARD motors. STANDARD V-Belts, STANDARD sheaves—all available from distributors' stock. It's lower in first cost, less expensive to install; no special engineering is necessary. Six sizes of Reduction Units give you any speed below 154 rpm for drives up to 25 hp. Here's an amazingly different slow-speed drive—IT PUTS THE GEARS WHERE THEY BELONG—*right on the shaft of the driven machine!* Over 50,000 are already paying their way throughout industry.

The American Pulley Company • 4210 Wissahickon Ave. • Phila. 29, Pa.

AMERICAN
REDUCTION DRIVES

SHOW ME . . .
. . . how to save by standardizing my slow-speed drives. Please rush my free copy of The American Drives Data Book.

NAME TITLE
COMPANY
ADDRESS
CITY STATE

BEHIND THE BYLINE

Facts About Factory's Authors

H. M. Alkire (page 66) started in the manufacturing business in 1912 with the Illinois Watch Co. After gaining experience with several other firms, he answered the call to duty in World War I. Back from the army, he spent 11 years with the Lourie Manufacturing Co., attaining the position of vice president and general manager. Mr. Alkire came to Allis-Chalmers' Springfield Works in 1930. There he worked on time study, planning, and expansion layout, became plant manager of Plant 2. Since 1944 he has been assistant to the works manager. In this capacity he has planned and supervised a big expansion program, including complete relayout of all departments and installation of modern materials handling equipment and methods.

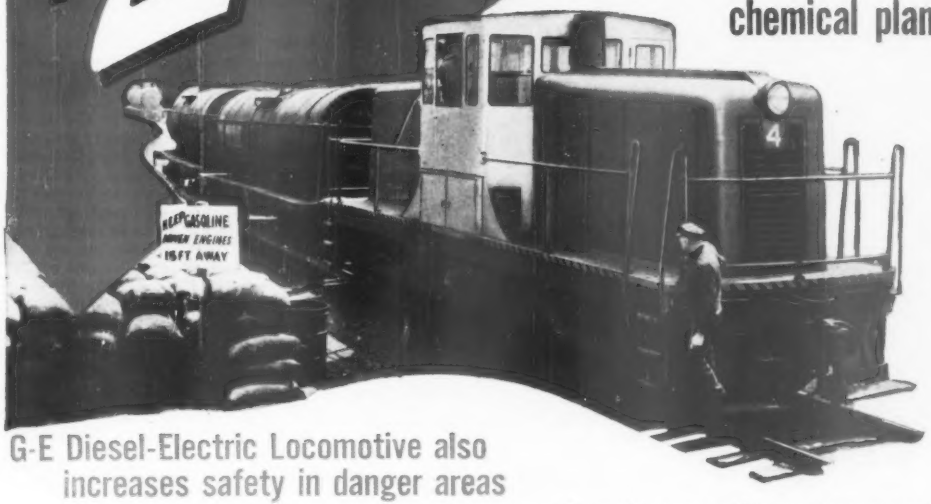
Fred J. Hillgruber (page 70) started out 25 years ago as a toolmaking apprentice with National Cash Register. In March, 1947, he became the company's safety director. In between, he worked with the tool inspection and educational - training departments; and took engineering and business administration at the Dayton Night School. While with the training department, he helped organize a machine shop training school. Along with his work as NCR's safety director, Mr. Hillgruber is on the executive committee of the Greater Dayton Safety Council. He has presented many safety lectures and programs to industrial groups in Dayton and the rest of the state.

Douglas C. Maxwell (page 72) got his electrical engineering degree from the University of Manitoba, Winnipeg, Canada. After serving in the Canadian Army, he joined the engineering department of the Winnipeg Electric Company, a public utility. Interest in the design and manufacture of electric power apparatus led him to the U. S. to join the Control Corporation of Minneapolis, a manufacturer of electric control equipment; and finally to the Electric Machinery Manufacturing Company, Minneapolis. Mr. Maxwell has a special interest in business administration. He is currently studying this field with the Alexander Hamilton Institute of New York. He is actively interested in sports, and his hobbies include woodworking and gardening.

(*Continued on page 238*)

SAVES $20,000

a year for chemical plant



G-E Diesel-Electric Locomotive also increases safety in danger areas

Slashes switching costs $1700 a month! Ready for work 95% of the time! Gives maximum safety in inflammable areas! The Calco Chemical Division of American Cyanamid knows that it made a wise investment by purchasing a 65-ton G-E diesel-electric locomotive to replace steam operation.

ANNUAL RETURN—47%

Delivered May, 1946, this 65-tonner is one of two G-E built locomotives used for transfer work and intra-plant switching at Bound Brook, N. J. The purchase price was paid back in less than 2½ years. Hourly fuel costs were cut 84%. Derailments, more than one a week with the steamers, were eliminated. Maintenance expenses were sharply decreased; and time out for maintenance and inspection now averages just 5% of the 16 hour working day.

HOW YOU CAN BENEFIT

This performance is typical of G-E locomotives in industry. Your plant will reduce switching time up to 50%—will switch cars dependably and economically—will maintain the safest, cleanest working conditions possible—if you switch with G-E diesel-electrics.

The savings in your plant can be accurately estimated in advance. Your G-E representative will help you determine your needs. Call or write him today.

Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GET THE FACTS ON LOW-COST SWITCHING!

- Operating Results
- Graphs
- Tables

Section AC-4909
General Electric Company
Schenectady 5, N. Y.

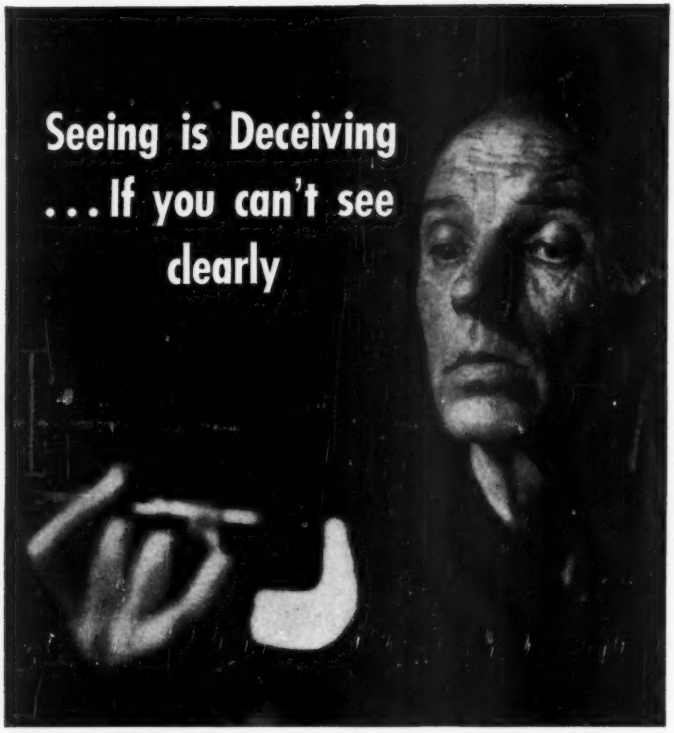
Without obligation send me your fact-filled locomotive bulletin "Switch to Diesel-electrics and Save," GEA-4909

Name .....

Company .....

City ..... *State* .....

GENERAL ELECTRIC



EYE SAFETY is a TWO-IN-ONE program

Faulty vision not only hinders an employee's working efficiency, but it impairs his safety. In your plant no less than 50% of workers need eyesight correction if they are to see clearly—and safely. That's why every eye safety program should be built on the basis of *protection plus correction.* Industrial eyewear with correction lenses, professionally-prescribed, will improve your safety record and your production record. Call on your Bausch & Lomb distributor for prompt prescription service on industrial eyewear.

Write for a copy of the Bausch & Lomb catalog on industrial eyewear. It includes a highly informative discussion of the theory and design of protective industrial eyewear. It also describes the complete line of Bausch & Lomb Occupational Eyewear, the eyewear built to the highest quality standards in the industry. Bausch & Lomb Optical Co., 650-L St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB *Safety Eyewear*

BEHIND THE BYLINE *(continued)*

W. H. Kohler (page 82) graduated from Brown University in 1936 with a B.S. in electrical engineering. The same year he went to work with Westinghouse as lighting application engineer. He has specialized in the design of large plant lighting systems, and has taken part in numerous lighting educational programs.

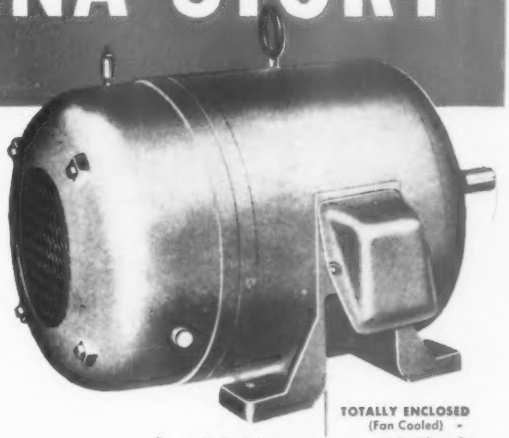
Arthur W. Wragby (page 86) was educated in England, left the Science and Arts School there in 1911 to come to the U. S. He joined the Glasscock Manufacturing Company. Ever since, he has devoted himself entirely to body designing, full-size layouts, and production of automobiles and coaches. From 1919 to 1928, Mr. Wragby was superintendent of production for Yellow Truck & Coach Company, Chicago, and helped to design the first yellow cab. Then he came to GMC, became plant superintendent in the Truck & Coach Division. He took charge of taxi cab and coach production, including chassis work.

G. S. Stringer (page 88) got his B.S. and M.S. degrees from Columbia University. He has a New York State professional engineer license. Now chief plant engineer at Ford Instrument Company, Mr. Stringer has 15 years' industrial experience, including time with Sheffield Farms and American Car & Foundry. During this period, his work has ranged from plant layout and installation of heavy machines to scheduling, cost analysis, and maintenance.

C. F. Newburg (page 110) began his working career as an apprentice machinist and machine adjuster with American Envelope Company. Later he worked with Central Ohio Paper Company and Farnsworth Television and Radio Corporation, where he was plant superintendent for ten years. He is now general superintendent of the United Specialties Company. He studied industrial engineering at Franklin and Purdue Universities. His hobbies include woodworking and radio, and he is interested in sports of all kinds, particularly hunting and fishing.

NO OTHER MOTORS CAN MATCH THIS STAMINA STORY

How ELECTRO DYNAMIC met a tough challenge with superior WINDINGS



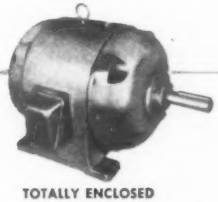
TOTALLY ENCLOSED
(Fan Cooled)
For use in dirt-laden atmospheres, especially where the installation requires a motor of compact dimensions.

Fifty years ago, when the Electric Boat Company set out to be the world's largest builder of submarines, it determined also to produce the *world's toughest* electric motors (because motor failure on a submarine could mean death to the entire crew). Therefore, in 1899, Electric Boat acquired the Electro Dynamic Company to develop and build these extra-reliable motors.

The tremendous increase in the cruising range of the submarine, from a few hundred to *many thousands* of miles, presented a terrific challenge to its electric motors. As a result, Electro Dynamic *windings*—"the heart of the motor"—had to be toughened beyond anything previously conceived, to withstand additional gruelling months of sustained performance. So well did Electro Dynamic meet this challenge that, in addition to submarines, its *stout-hearted* motors have been installed on *over 50% of all American merchant ships* built since the war.

That is the story behind the new ELECTRO DYNAMIC *industrial motors*. Today, the same E.D. craftsmen that achieved greater stamina in marine motors are putting *extra care* and *superior materials* into the Electro Dynamic industrial line. Never before have motors of such high quality been offered at competitive prices! Write for illustrated literature today.

DRIP-PROOF MOTORS
For use under ordinary conditions not requiring protection from splashing liquids or dirt-laden atmosphere.



TOTALLY ENCLOSED
(Non-Ventilated)
For use in exceptionally dirty atmospheres, particularly when metallic dust is present.

SPLASH PROOF
For installation where the motor is subjected to splashing liquids or hosing down for cleaning.

Also a Complete Line of DIRECT CURRENT Motors and Generators. Literature on Request.

Industry is learning what marine engineers have known since 1880

ELECTRO DYNAMIC
makes great motors

ELECTRO DYNAMIC • Division of the Electric Boat Company • Bayonne, N. J.

OIC goes *beyond* the regular specifications to provide an extra margin of strength and durability in the valves you buy. For example, all pressure parts of OIC steel valves rated at 300-lbs. and above are cast not from ordinary carbon steel (which meets requirements) but from tougher carbon-molybdenum steel. That gives you *more* strength and safety over the full range of temperatures . . . at no additional cost!

There's no skimping anywhere in OIC valve design and manufacture. Extra-deep stuffing boxes, extra-long thread contact between stem and yoke bushing, extra-strong body-bonnet joints, extra body wall thickness . . . all make for *plus* performance. You can trust the products of OIC, pace-setter in valves!

0-317-6

248 PAGES OF VALVE DATA

Just off the press, this useful new OIC catalog is crammed with facts and specifications on steel, iron and bronze valves. Demand is already large, so mail the coupon to *obtain your copy NOW!*

MAIL THIS COUPON TODAY!

The Ohio Injector Company — Wadsworth, Ohio

Please send me a copy of the new OIC valve catalog and data book.

Name _____ Position _____

Firm _____

Address _____

City _____ Zone _____ State _____

OIC

STEEL
IRON
BRONZE

VALVES

Bright future... for this insulation investment

Each day many men in industry ask themselves this question—*Just how should I go about getting the most out of each insulation dollar?* The answer, as with any investment, depends on several factors.

First, there's the reputation of the insulation manufacturer; the type of materials he has to offer; the efficiency of those materials in saving fuel. Next, there is the kind of service the manufacturer offers for engineering and applying his insulations.

This last consideration is a mighty important one. For, assuming all other things to be equal, it is the selection of the right insulation and the correct application of it that pays off in the long run on your insulation investment.

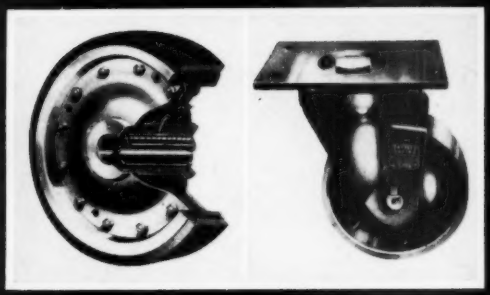
... And that's where Johns-Manville leadership in application service can be of utmost help to you. Your Johns-Manville Insulation Applicator selects the right materials for your specific job from the wide variety of J-M insulations that are available (for temperatures from minus 400F to 3000F above zero).

You will benefit by the long experience of your J-M Insulation Contract firm in all phases of insulation application . . . from engineering the job to the skill of his mechanics in applying the insulations.

If you have an insulation problem, write to the blue chip name for insulation investments—Johns-Manville, Box 290, New York 16, New York.

Johns-Manville *first in* **INSULATIONS**

for Every Type of Floor



DARNELL
CASTERS & WHEELS

Choose just the right caster or wheel for your needs from the Darnell line of nearly 4000 types. These precision made casters and wheels will help you speed up production . . .

DARNELL CORP. LTD. Long Beach 4, Calif.

60 Walker St., New York 13, N. Y.
36 N. Clinton, Chicago 6, Ill.

BOOKS

Industrial Electronics

ANDREW W. KRAMER, editor. Power Generation. Pitman Publishing Corp., 2 W. 45th St., New York 19. 311 pp. Drawings, diagrams, tables, figures, formulas, graphs, index. $5.

Subtitled "Elementary Principles and Applications," this book tells in simple language how the principles of electronics are used in industry. It does not use mathematics, but explains what electron tubes are, how they were developed, and how they operate.

Public Speaking for Businessmen

WILLIAM G. HOFFMAN, chairman of English Dept., Boston Univ., Col. of Bus. Admin. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, 3rd ed. 412 pp. Lists, examples of speeches, radio talks. $3.50.

What to say and how to say it, how to fashion a talk to suit both your audience and the topic under discussion—these are some of the points discussed in this book. It presents the basic principles of public speaking, with emphasis on practical, every-day use.

Development of Executive Leadership

Edited by **MARVIN BOWER**, partner, McKinsey & Co., chairman, Alumni Conference Com., Harvard Bus. School Assn. Harvard Univ. Press, Cambridge, Mass. 130 pp. $2.50.

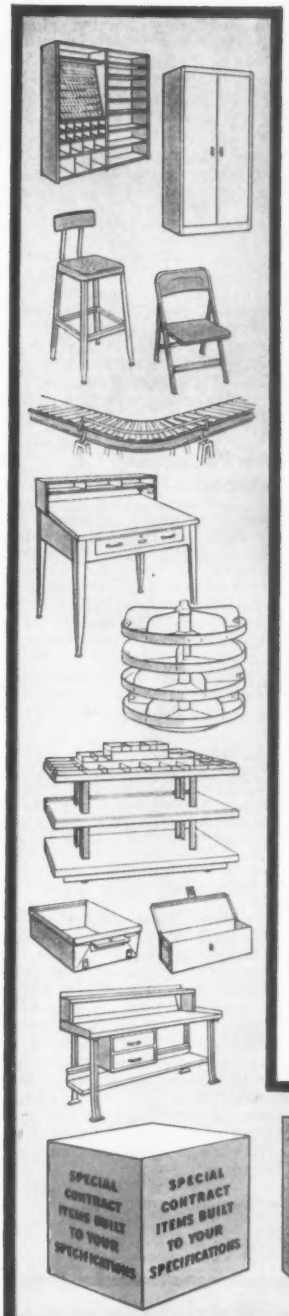
This book is divided into two sections: The Kind of Business Leaders We Need, and Steps in Developing the Kind of Business Leaders We Need. It contains articles by five top management executives and one economist. Each points out the importance of the influence of effective leadership on the period ahead, with specific illustrations of how business leaders can help shape public opinion so as to create sound thinking and more effective leadership.

Applied Experimental Psychology

ALPHONSE CHAPANIS, asst. prof. of psychology, **WENDELL R. GARNER**, director, Psychological Laboratory Institute for Cooperative Research, and **CLIFFORD T. MORGAN**, chairman of Psychology Dept., all of Johns Hopkins University. John Wiley & Sons, Inc., 440 4th Ave., New York 16. 434 pp. Photographs, sketches, graphs, charts, tables, specimen test results, references; indexes of subjects, names. $4.50.

Subtitled: "Human Factors in Engineering Design."

In writing this, the authors have defined the subject matter of the book, discussed important experimental and statistical techniques, and reported on the material developed in the field for the past several years.

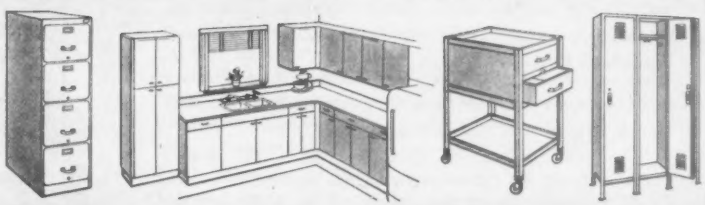


LYON

Number One supplier of STEEL EQUIPMENT to the Nation's Industries and Institutions

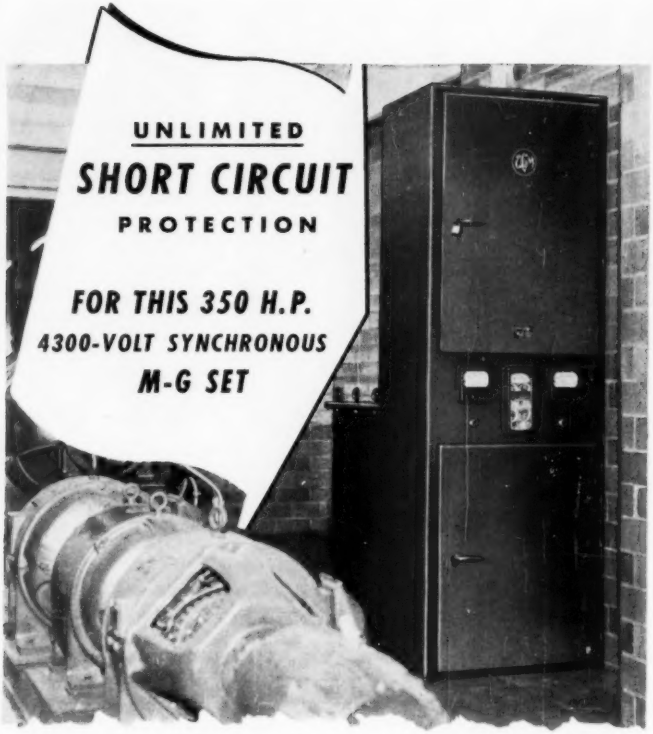
LYON METAL PRODUCTS, INCORPORATED

General Offices: 1212 Monroe Avenue, Aurora, Illinois • Branches and Dealers in All Principal Cities



A PARTIAL LIST OF LYON PRODUCTS

• Shelving	• Kitchen Cabinets	• Filing Cabinets	• Storage Cabinets	• Conveyors	• Tool Stands	• Flat Drawer Files	
• Lockers	• Display Equipment	• Cabinet Benches	• Bench Drawers	• Shop Boxes	• Service Carts	• Tool Trays	• Tool Boxes
• Wood Working Benches	• Hanging Cabinets	• Folding Chairs	• Work Benches	• Bar Racks	• Hopper Bins	• Desks	• Sorting Files
• Economy Locker Racks	• Welding Benches	• Drawing Tables	• Drawer Units	• Bin Units	• Parts Cases	• Stools	• Revolving Bins



with **E C & M VALIMITOR**
(Volt-Ampere-Limitor) STARTER

There's no ceiling on VALIMITOR protection because fault currents are limited to a maximum of 25,000 KVA (steady state current) and the well-known Type ZHS Contactor used in these starters clears such faults quickly.

Because protection is *unlimited*—there's no need for calculating existing short circuit capability—no need to fear that these starters will be out-moded by future growth in KVA.

Also there are no fuses to replace after a fault. Protection is *permanent*, today and forever.

Write for COMPLETE FACTS—ASK FOR
No. 23 ACCELERATOR BULLETIN

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

The growth of time and motion study and its use in industry is thoroughly covered, as is its application to job simplification, and the use of applied experimental psychology in personnel selection and training.

Methods of Joining Pipe

J. E. YORK, Stone & Webster Engineering Corp. The Industrial Press, 148 Lafayette St., New York 13. 236 pp. Sketches, diagrams, tables, index. $3.

This volume is subtitled "Standard and special joints for different classes of pipes and pipe materials, including steel, cast iron, duriron, brass, copper, lead, chemical tile, vitreous tile, synthetic resin, plastic, concrete, glass, transite, and wood." Each section is illustrated with drawings showing applications of the various kinds of joints.

Modern Packaging Encyclopedia

Breskin Publications, 122 E. 42nd St., New York 17. 932 pp. Photographs, sketches, diagrams, charts, lists; samples of papers, foils, fabrics, colors; indexes, buyers directory. $5.

The 1950 edition of this annual encyclopedia contains contributions from 84 authorities in the field of scientific packaging. A new feature is a chapter on "Packaging Achievements" which reports and analyzes case histories of successful methods used to solve packaging problems.

Depreciation

EUGENE L. GRANT, prof. of economics of Engineering, Stanford Univ., and **PAUL T. NORTON, Jr.**, vice president and treasurer, Case Crane & Kilbourne Jacobs Co.. The Ronald Press Co., 15 E. 26th St., New York 10. 472 pp. Graphs, charts, tables, specimen records, appendixes A through F, index. $5.

The authors have divided this book into four parts: Some Fundamental Concepts. The Treatment of Depreciation for Accounting and Income Tax Purposes; Some Business Problems Related to Depreciation Accounting, and The Public Viewpoint. It is intended to serve as a manual for anyone responsible for the accounting treatment of depreciation. It reports on business decisions related to the fact of decline in value of physical assets, and includes various legal decisions and regulations.

BOOKLETS

THE ECONOMIC POWER OF LABOR ORGANIZATIONS. A statement by Ben Moreell, chairman of the Board of Directors and president of Jones & Laughlin Steel Corp., to the Committee on Banking & Currency of the U. S. Senate. Jones &

Make HARPER your SINGLE SOURCE

for non-ferrous and stainless steel fastenings. *Only Harper carries large stocks of* **6,000 DIFFERENT ITEMS** *in from* **3 TO 10 DIFFERENT METALS!**—*the widest assortment of bolts, nuts, screws, washers, rivets and accessories available from* **ONE SOURCE** *in a great variety of dimensions, threads, heads and sizes.* **BRASS·BRONZES·COPPER·MONEL AND STAINLESS STEELS**

Convenient Warehouse Service for prompt delivery to any point in the country.

Specials made to order from ample stocks of raw materials.

Wire or phone your requirements to nearest Branch Office. Complete 134-page color catalog gladly sent upon request.

HARPER

THE H. M. HARPER COMPANY

General Offices and Plant: Morton Grove, Ill. (Suburb of Chicago)

New York Office and Warehouse—200 Hudson Street, New York 13.

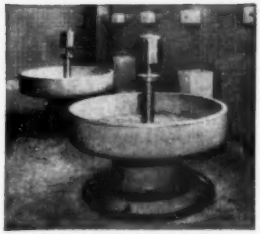
Los Angeles Office and Warehouse—835 East 31st St., Los Angeles 11.

BRANCH OFFICES: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Milwaukee, Oakland, Philadelphia, Pittsburgh, St. Louis, Seattle, Toronto (Canada).

EVERLASTING FASTENINGS

Modernize - OR ADD TO WASHROOM FACILITIES

BRADLEYS
Will Do The Job



Eight to 10 persons are served simultaneously by the 54" full-circle Bradley. Wall type, semi-circular model, serves four to six.

For easy installation, economical service and minimum maintenance, choose Bradley Washfountains. Whether for additional facilities or modernizing an entire washroom, modern, sanitary Bradleys will do the job better.

One Bradley serves 8 to 10 persons simultaneously thus eliminating numerous "single-person" wash basins. Foot-control operation and absence of contagious faucets gives maximum health protection. The Bradley sprayhead does the work of 16 to 20 faucets and makes possible savings up to 75% in water consumption. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan Street, Milwaukee 1, Wis.

BRADLEY washfountains

Distributed Through Plumbing Wholesalers.

Big 24-page Catalog 4701 sent free upon request.

Kester Soldering FLUX

62 DIFFERENT FLUXES to meet Your Requirements

Kester makes a flux for every soldering operation because modern efficiency demands the correct flux for the job. Consult Kester's Technical Department on any flux problem.

Liquid Fluxes—Soldering Salts and Paste

Free—Technical Manual, "Solder and Soldering Technique"

1899 50th Anniversary 1949

KESTER SOLDER

KESTER SOLDER COMPANY
4201 Wrightwood Avenue, Chicago 39, Ill.
Factories also at
Newark, New Jersey • Brantford, Canada

Laughlin Steel Corp., 3rd Ave. & Ross St., Pittsburgh 30. 8 pp. No charge.

MULTI-EMPLOYER BARGAINING AND THE ANTI-TRUST LAWS. Bert W. Levy. Industry-Wide Collective Bargaining Series. University of Pennsylvania Press, 3446 Walnut St., Philadelphia 4. 82 pp. $1.50.

BUYING AND ADMINISTERING CORPORATE INSURANCE. Russell B. Gallagher. Research Report No. 15. American Management Assn., 330 W. 42nd St., New York 18. 123 pp. Specimen forms, questionnaires; tables, charts, graphs; appendixes I, II. $3.75.

ON THE CALENDAR

DECEMBER

1-2, Council of Profit Sharing Industries, 2nd Annual Conference; Hotel Roosevelt, New York. Joseph B. Meier, Executive Secretary, 1st Nat'l. Tower, Akron 8, O.

1-2, American Leather Belting Association, Annual Meeting; Hotel Commodore, New York. E. R Rath, Executive Vice President and Secretary, 41 Park Row, New York.

1-2, American Management Association, Finance Meeting; Waldorf-Astoria, New York. James O. Rice, Conference Manager, 330 W. 42nd St., New York 18.

2, Society for the Advancement of Management, 2nd Annual Regional Discussion Conference; Warwick Hotel, Philadelphia. A. L. Mettler, General Chairman, Electric Storage Battery Co., Philadelphia 22.

4-7, The American Society of Refrigerating Engineers, Annual Meeting; Edgewater Beach Hotel, Chicago. M. C. Turpin, Secretary, 40 W. 40th St., New York.

7-9, National Association of Manufacturers, 54th Congress of American Industry; Waldorf-Astoria, New York. Lawrence D. Marks, Director, 14 W. 49th St., New York.

8, Society for the Advancement of Management, National Council on Training and Education in Industry; Hotel Lexington, New York. X. F. Sutton, General Chairman, 475 5th Ave., New York 17.

8-10, American Institute of Mining Engineers, 7th Annual Electric Furnace Steel Conference; William Penn Hotel, Pittsburgh. Dr. Ernest Kirkendall, Assistant Secretary, 33 W. 39th St., New York 18.

29-30, American Chemical Society, Christmas Symposium on Absorption and Extraction; Columbus, O.

2 DELTA-MILWAUKEE® MACHINES THAT CUT TIME AND COSTS FOR PLANT MAINTENANCE JOBS

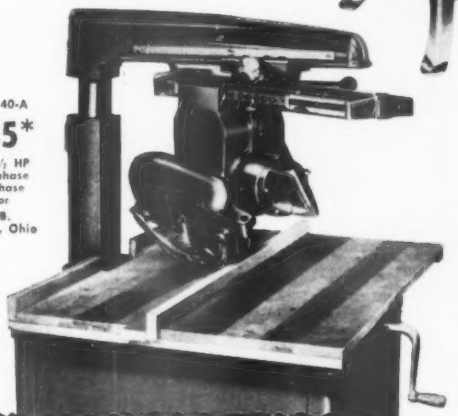
DELTA MILWAUKEE®

10" circular saw and 6" jointer mounted on one steel stand

$235.75*

without motor or switch rod

Your nearby Delta distributor can supply these popular machines on easy credit terms. Look for his name under "Tools" in the classified section of your telephone directory.



Model 40-A

$385*

with 1½ HP single-phase or 3-phase motor

F.O.B. Norwalk, Ohio

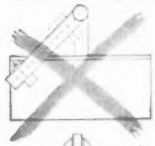
1 Delta Saw-Jointer Combination

Two machines mounted together to save floor space. Extra convenience cuts your costs, boosts your output. 10" saw blade cuts 3¼" stock. Rips to center of 50" panel. Jointer surfaces boards 6" wide; cuts rabbets ½" deep. Saw table tilts 45° to right. Either machine may be used singly or both together — by one man or two. There is no interference between saw and jointer. Both are driven by same motor. See Catalog B-48 for complete description. Send coupon for your copy.

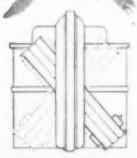
2 Delta Multiplex Radial-Arm Saw

Like a whole shopful of handy tools in one. It rips, cross-cuts, miters, shapes, tenons, plows, rabbets — and does many more operations. You can put the cutting arm at any angle — and get 100% mitering capacity. Model 40A, shown, uses a standard 12" blade, although a 14" blade can be used. It has a rip capacity up to 3¼". Your Delta distributor has Multiplex models in a range of sizes, with motors of ½, ¾, 1½, 3, 5, 7½, and 10 HP, and rip capacities up to 6". Send coupon for descriptive literature.

You get *more capacity*, with a Delta Multiplex Radial-Arm Saw!



Old Way — Saw arm pivots from column. Practically no mitering capacity at 45°, not much at 30°, and almost none beyond 45° on left-hand miters.



Modern Delta Multiplex Way — Saw arm is center-pivoted. Set quickly to cut any miter — right- or left-hand — at full capacity up to 90°. Saw rotates through 360° in unlimited number of positions.

POWER TOOL DIVISION
Rockwell Manufacturing Company
MILWAUKEE 1, WISCONSIN

WM-27 *Prices subject to change without notice

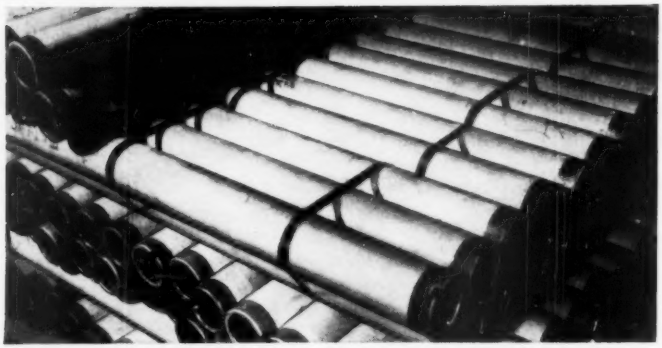
TEAR OUT COUPON AND MAIL TODAY!

POWER TOOL DIVISION
ROCKWELL MANUFACTURING CO.
618 N. E. Vienna Ave., Milwaukee 1, Wis.

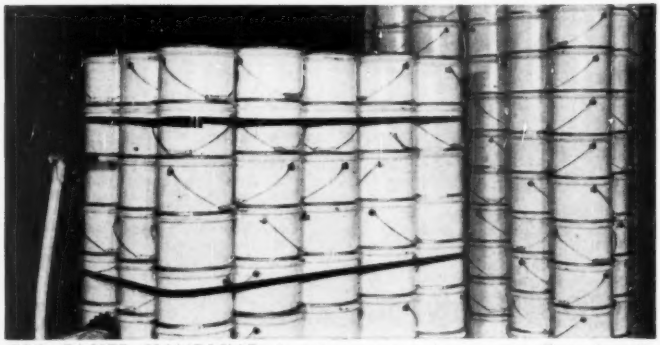
Send me the following: ☐ Catalog B-48
☐ Literature on Delta Multiplex Radial-Arm Saws

Name .....
Title .....
Company .....
Address .....
City ..... ( ) State .....

Cut handling costs with this amazingly strong tape!



5 TIMES STRONGER than most high strength industrial tapes now on the market! "SCOTCH" Filament Tape No. 880 turns newsprint cores into easy-to-handle, easy-to-store bundles. Note that tape's strong adhesive holds each core to prevent side-slippage during interplant handling and shipment. Tape applies with simple hand pressure, removes quickly, cleanly. No special application or skilled labor needed.



FOR EASIER HANDLING, liquid-containing drums are palletized with "SCOTCH" Filament Tape No. 880. Tape's surprising strength comes from thousands of rayon filament "cables" which reinforce the tape as steel rods reinforce concrete. Tape is safe to use. No sharp edges to mar finishes, cut cartons, injure workmen. Use it for any heavy-duty bundling or strapping job! Available in colors: Red, White, Blue, Black, and Transparent for product identification. Write Dept. FM-129.

ANOTHER 3M COMPANY PRODUCT

MINNESOTA MINING & MFG. CO., St. Paul 6, Minn.

also makers of other "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Sound Recording Tape, "UNDERSEAL" Rubberized Coating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.*
In Canada: CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

Dr. Lincoln T. Work, Metal & Thermit Corp., Rahway, N. J.

JANUARY

10-13, Society of the Plastics Industry, Reinforced Plastics Division; Hotel Cleveland, Cleveland, O. Wm. T. Cruse, Executive Vice President, 295 Madison Ave., New York.

9-13, The Society of Automotive Engineers, Inc., Annual Meeting and Engineering Display; Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 W. 39th St., New York.

11-13, Society of Plastics Engineers, Inc., Annual National Technical Conference; Hotel Carter, Cleveland. Richard L. Huber, Chairman, Hercules Powder Co., Cleveland.

16-19, First National Plant Maintenance Show, Public Auditorium, Cleveland. Clapp & Poliak, Inc., Mgrs., 341 Madison Ave., New York 17.

16-20, Industrial Management Institute. Production Planning and Control. Extension Division, University of Wisconsin, Box 2090, Madison, Wis.

18-20, American Management Association, General Management Conference; St. Francis Hotel, San Francisco. James O. Rice, Conference Manager, 330 W. 42nd St., New York 18.

23-27, Southwest Air Conditioning Exposition; State Fair Park, Dallas, Texas. Charles F. Roth, Manager, 480 Lexington Ave., New York 17.

23-27, American Society of Heating & Ventilating Engineers, 56th Annual Meeting; Adolphus and Baker Hotels, Dallas, Texas. A. V. Hutchinson, Secretary, 51 Madison Ave., New York 10.

24-26, Industrial Management Institute, Interviewing, Testing, and Counseling; Extension Division, University of Wisconsin, Box 2090, Madison, Wis.

30-Feb. 3, American Institute of Electrical Engineers, Winter General Meeting; Statler Hotel, New York. H. H. Henline, Secretary, 29 W. 39th St., New York 18.

FEBRUARY

13-15, American Management Association, Personnel Conference; Palmer House, Chicago. James O. Rice, Secretary, 330 W. 42nd St., New York 18.

20-21, 2nd Annual Materials Handling Conference on New Approaches to Material Handling Problems; Purdue University, Lafayette, Ind.

Job File No. 1949

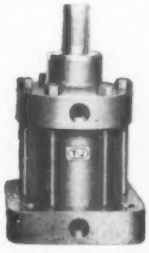
MALLEABLE NUT PRODUCTION

Fully Automatic

CONTROLLED BY T-J CYLINDERS

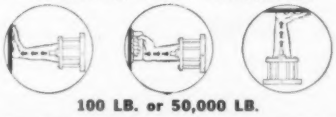
All moving parts are controlled hydraulically by T-J Cylinders —on this Malleable Nut Production Machine designed and built by Roy Hays & Associates, Rockford, Ill., for the Wagner Malleable Products Co., Decatur, Ill.

It's *fully automatic*—the operator only places nuts in stations. Nine T-J Cylinders, 40 ton to ½ ton, help complete the job of cutting off sprue, sizing, boring, facing, chamfering and threading 2,500-¾ std. pipe thread nuts per hour.



For your tough jobs of power movement —pushing, pulling or lifting—*save labor, speed production* and *cut costs* with T-J Air and Hydraulic Cylinders! Many standard sizes and styles . . . both cushioned and non-cushioned types . . . 100 lb. or 50,000 lb. Precision-built for long-life dependability. Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Michigan.

FOR POWER MOVEMENT IN ANY DIRECTION



100 LB. or 50,000 LB.

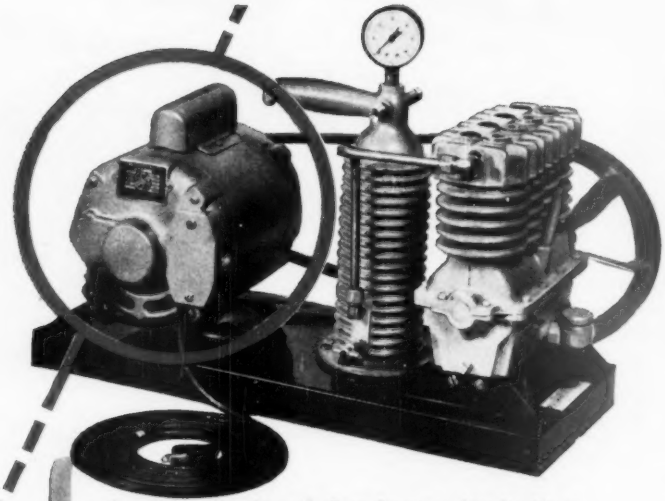
32 YEARS EXPERIENCE

T-J

TOMKINS-JOHNSON

RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

A. O. Smith Builds Electric Motors . . . .



for hundreds of Products, Including

"PRESSURE QUEEN" AIR COMPRESSORS

If the power component in your product calls for an electric motor, with the prime requirements economy, compact design, and improved performance, consult the A. O. Smith sales engineer. He offers you the complete facilities of the research and engineering staff at A. O. Smith, to help integrate electric-motor design with your product design. "Pressure Queen" Air Compressor is a typical example of this A. O. Smith service.

PRESSURE QUEEN, product of The Campbell Hausfeld Company, Harrison, Ohio, is a 4-cylinder air compressor with many industrial, garage, farm, and home uses, for blowing, cleaning, painting—all jobs which require no more than 3 cu. ft. of air per minute at 60-lb. working pressure. "Pressure Queens" are thoroughly run in before delivery.

A. O. SMITH ELECTRIC MOTOR is ½ hp, 115/230 v, 60 cycle, single phase, 56 frame, 1800 rpm. Pre-lubricated sealed ball bearings are self-protected from dirt and dust.

24-HOUR MOTOR SERVICE. To more than 200 authorized service stations, A. O. Smith Product Service Division provides fast, low-cost electric-motor service, on a 24-hour, off-the-shelf basis. Factory Service Branches and Warehouses at Union, N. J., Chicago 17, Dallas 2, Los Angeles 12.

Ask the A.O. Smith sales engineer about electric motors for both standard and special uses . . .

A.O. Smith Corporation, Dept. FM-1249
5715 Smithway St.
Los Angeles 22, Calif.

Without obligation, send us full information on A.O. Smith Electric Motors.

Name _____

Firm _____

Street _____

City _____ State _____

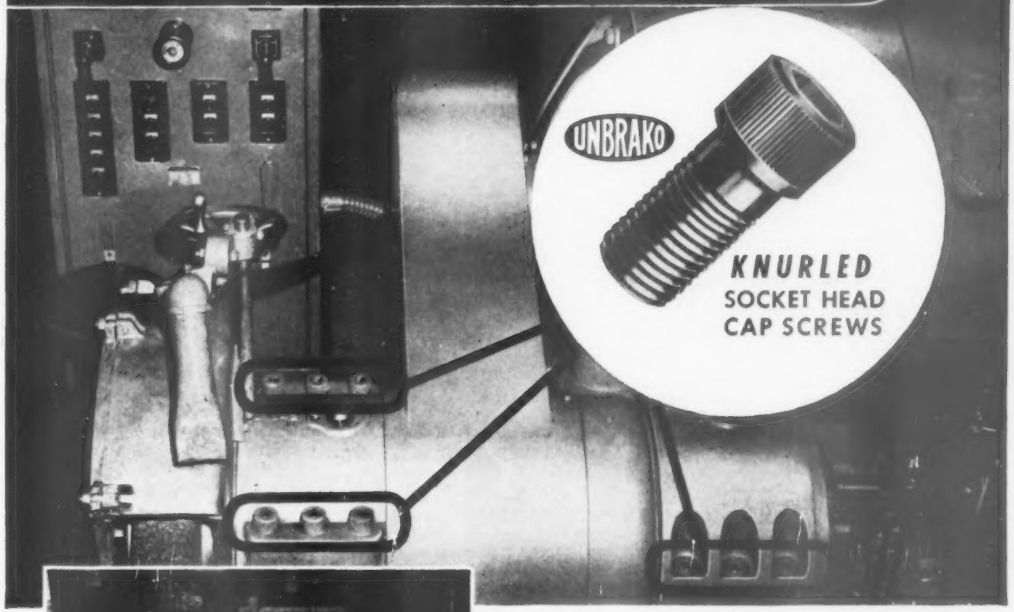
75th ANNIVERSARY 1853 - 1948

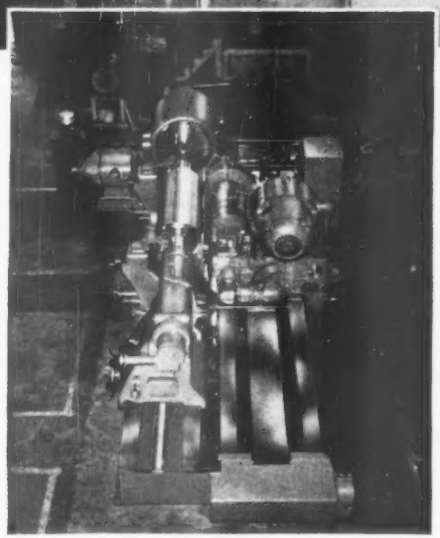
A.O.Smith

ELECTRIC MOTORS

Boston • New York • Pittsburgh • Cincinnati • Syracuse
Cleveland • Atlanta • Chicago • Minneapolis • Detroit
Milwaukee • Houston • Tulsa • Dallas • Denver • Seattle
Los Angeles • San Francisco
Motor Export Department: 13 East 40th St., New York 16

and on this new
LOBDELL STEEL MILL ROLL GRINDER
they use many





More than 700 UNBRAKO Socket Head Cap Screws—ranging in size from #10 to 1 7/16"—were used on this new Lobdell Machine. They were specified because they are extra strong, made to close tolerances and provide material savings in assembly time.

Perhaps, you, too, can benefit by using these UNBRAKO Socket Screws in assembling your product. Write for descriptive literature and samples, today.

SPS **STANDARD PRESSED STEEL CO.**

JENKINTOWN 11, PENNSYLVANIA

"UNBRAKO Quality Counts With The Men Who Count"

Silicone News

DC SILICONES

Here's How DC Silicone Insulation Reduces Motor Failure

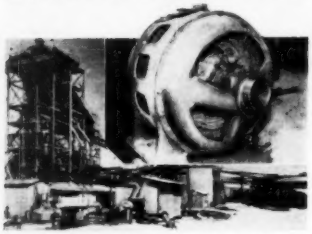


Photo courtesy Virginia-Carolina Chemical Corp.

THIS 300-H.P. silicone insulated motor was back in service three hours after being flooded with water, mud and waste.

• Engineers of Virginia-Carolina Chemical Corporation agree that DC Silicone Insulation is the best solution to motor failure caused by excessive moisture. They proved this in two identical 300-h.p. motors, one wound with Silicone (Class H) and the other with Class B insulating materials.

Located side by side and exposed to the same operating conditions, these motors are used to pump waste materials at the Phosphate Mine in Homeland, Florida. After the main line broke last year and flooded both motors with water, mud and waste, the Class B motor had to be reworked and rebaked. The motor wound with Class H insulation was simply cleaned with an air hose and the bearings were flushed out . . . ***Three hours later, the SILICONE INSULATED motor was back in service and operating perfectly.***

That confirms again the fact established by 4 years of motor testing: Class H Insulation made with Dow Corning Silicones has at least 10 times the life and 10 times the wet insulation resistance of the best insulating materials previously available. For more information on how silicone insulated equipment can save you time and money, phone our nearest branch office or write for booklet R-12.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Atlanta • Chicago • Cleveland • Dallas
Los Angeles • New York
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

FIRST in Silicones

Dow Corning

FACTORY'S CATALOG SERVICE

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY

—1—
ASSEMBLIES, HYDRAULIC CYLINDER—single and double acting. 4-pg. illustrated folder on standard design, operating characteristics. Hydraulic Equipment Co.

—2—
BEAMS, STEEL — light, hot-rolled Junior Beams. Complete technical data for installation in 24-pg. bulletin. Jones & Laughlin Steel Corp.

—3—
BOXES AND CRATES, WIREBOUND — Photographs and drawings. Features, list of 4 basic styles. Wirebound Box Mfrs. Association.

—4—
CABLE—"Selection of Proper Cable Sizes," asbestos-varnished cambric cables, types AVA, AVB, AVL. Reference tables. General Electric Co.

—5—
CABLE, INSULATED—called High Ampere AVC. 26-pg. catalog with graphs, tables, illustrations. Features, specifications, installation tips. Rockbestos Products Corp.

—6—
CEMENT, ANTI-BACTERIAL — for safe, sanitary floors. Description, test results. North American Cement Corp.

—7—
CHAIN HOIST—hand. Features, illustrations, price. Other hoists mentioned. Harrington Co.

—8—
CLAMP, GROUNDING—for electric welders. Features, description. 4 pgs. Dings Magnetic Separator Co.

—9—
COATING, PLASTIC — is peelable, protective. Illustrated bulletin gives many applications. Better Finishes & Coatings, Inc.

—10—
COATING, PROTECTIVE — called Stonhard Stoncote. Lists uses, colors available. Stonhard Co.

—11—
COMPOUNDS, COATING & CLEANING—for spray booth maintenance. Lists chemicals available, information on how to use them. Klem Chemicals, Inc.

—12—
CONDENSERS — Called SK Low-Level Multi-Jet. Described in Bul. 5-A. Specifications, drawings, photographs. Schutte & Koerting Co.

—13—
CONTROL, TOOL CRIB — "How Tool Costs Were Cut 12 Ways in 20 Plants." Description of system. McCaskey Register Co.

—14—
CONVEYORS — all types. Illus

MAILING COUPON — GOOD UNTIL JANUARY 31, 1950, ONLY

FACTORY MANAGEMENT & MAINTENANCE (December, 1949)
330 West 42nd Street, New York 18

Please have manufacturers send me, without obligation, literature below:

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	51	52
53	54	55	56	57	58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73	74	75	76	77	78
79	80	81	82	83	84	85	86	87	88	89	90	91
92	93	94	95	96	97	98	99	100				

Name ..... Title .....

Company .....

Street Address .....

City ..... State .....

Please fill out this coupon completely in order to avoid delay in handling. Numbers correspond to description paragraph numbers. Where separate catalogs are described in one announcement, please specify exactly which are desired.

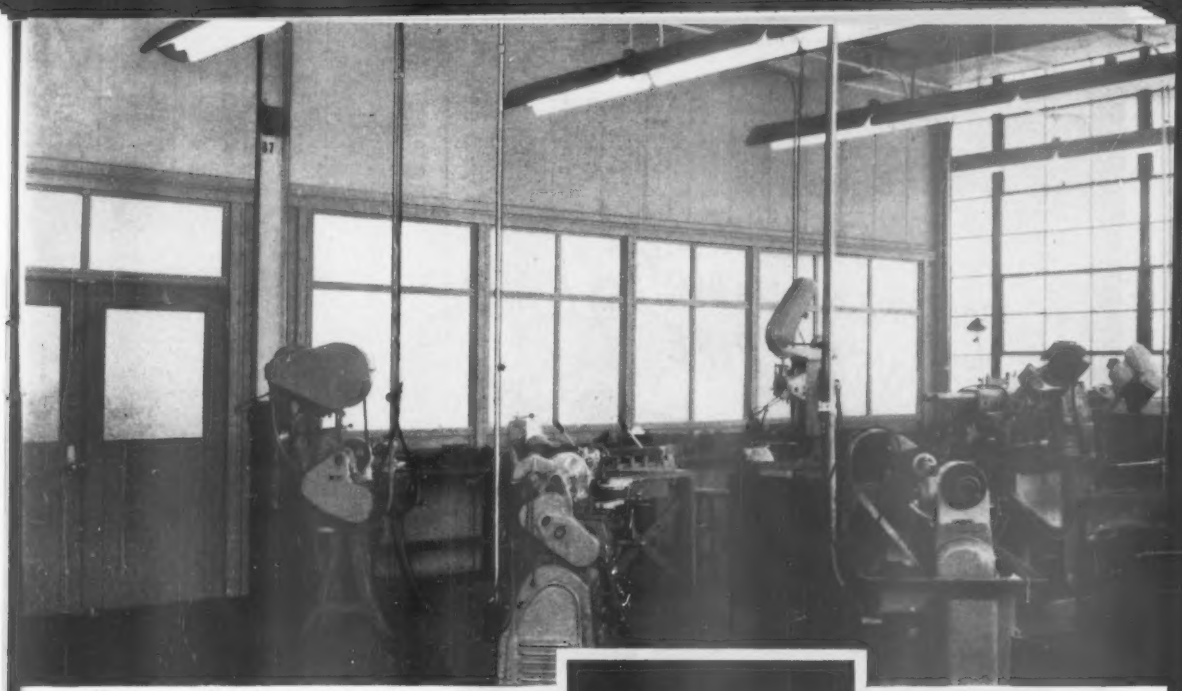


Photo courtesy of Victor Animatograph Corp., Davenport, Iowa

WILL THIS DEPARTMENT BE *here* NEXT YEAR?

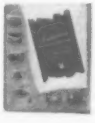
That's a good question. Especially today when rapid technical developments often make it necessary to move old departments, create new ones and reallocate space generally.

Thousands of manufacturers have met this problem by installing Hauserman *Movable* Steel Interiors in every department . . . from the president's office to the shipping room.

They know from experience that Hauserman Interiors can be moved quickly and inexpensively whenever new floor layouts will promote production or administration efficiencies. What's more, there's a suitable Hauserman Interior for every operation and construction requirement.

A Hauserman representative nearby will be glad to show you all the many Hauserman advantages. Just write or call him, or contact *The E. F. Hauserman Company, 6756 Grant Avenue, Cleveland 5, Ohio.* There's no obligation, of course.

Our fully-illustrated, 68 page catalog will show you how Hauserman Interiors can be adapted to your building. Just drop us a line and a free copy will be on the way to you.



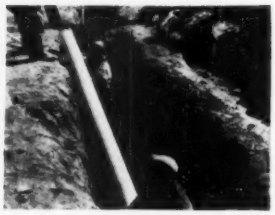
Organized for Service Nationally Since 1913

HAUSERMAN
Movable Steel Interiors

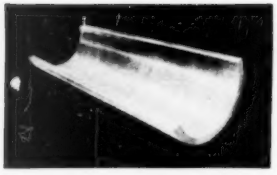
Partitions • Wainscot
Railings • Acoustical Ceiling
Complete Accessories

1. LOW INSTALLATION COSTS:

Water lines are quickly assembled . . . pipe crews lay more pipe per day . . . when Transite* Pressure Pipe is used for factory water lines—because Transite is light, easy to handle . . . because joints are easily made and readily checked during assembly . . . because deflections up to 5 degrees at each joint permit laying pipe around curves without special fittings.



2. LOW OPERATING COSTS:



Transite Pipe has a smooth interior surface that offers minimum resistance to flow of water. Furthermore, its initial high flow capacity cannot be reduced by tuberculation—the internal corrosion that reduces the flow capacity of ordinary water pipe. This helps assure high pressures and an ample volume of water for future requirements . . . helps keep pumping costs low.

3. LOW MAINTENANCE COSTS:

Transite Pressure Pipe is made of asbestos and cement by a special Johns-Manville process that develops exceptional resistance to corrosion. This has been substantiated in numerous industrial water lines and is an index of the long service to be expected of Transite Pipe. In addition, Transite's tight, flexible joints guard against costly underground leakage—further assurance of low water-line maintenance over the years.

For further information write for booklet "Engineering Facts about Transite Pressure Pipe." Address Johns-Manville, Box 290, New York 16, N.Y.

*Reg. U. S. Pat. Off.

JM

Johns-Manville

TRANSITE PRESSURE PIPE

for Water Supply Lines • for Fire Lines • for Process Lines

trated. Descriptions, uses. Island Equipment Corp.

—15—

COUPLINGS, HOSE — suction and water. Illustrated Bul. 5 lists types, sizes. Hose Accessories Co.

—16—

CUTTER, CABLE — for large or small-diameter B-X. Other tools. Ideal Industries, Inc.

—17—

CUTTERS, THREAD MILLING—Specifications, sizes, and prices. Also multiple thread milling cutters. Pratt & Whitney Div., Niles-Bement-Pond Co.

—18—

DRIVES, HELICAL GEAR — enclosed. 18-pg. Manual MPA. Single, double, and triple reduction types. Ratings, dimensions. Foote Bros. Gear and Machine Corp.

—19—

EQUIPMENT, CORROSION RESISTANT — and materials. Bul. M lists many types, gives uses, specifications, illustrations. U S. Stoneware Co.

—20—

EQUIPMENT, LIGHTING — Up-to-date list of company's lighting units, 40 pages. Specifications, prices, functions. Benjamin Electric Mfg. Co.

—21—

EQUIPMENT, MAGNETIC—Cat. C-5000A, illustrated. Specifications, uses for separating magnetic, non-magnetic products. Dings Magnetic Separator Co.

—22—

EQUIPMENT, MATERIALS HANDLING—8-pg. Cat. GP-7 on dollies, skids, hand trucks. Descriptions, illustrated. Ironbound Box & Lumber Co.

—23—

EQUIPMENT, MATERIALS HANDLING—Cat. 1201MH, 32 pp., gives specifications of running gear, trucks, other materials handling items. Market Forge Co.

—24—

EQUIPMENT, PIPE INSTALLING —Punches, benders, pump, 4 pp., illustrated. Blackhawk Mfg. Co.

—25—

EXTINGUISHERS, FIRE — Models 20- and 30-B. Features, assembly drawings. Ansul Chemical Co.

—26—

FIXTURES, LIGHTING—Bul. 10-E 1, metal fixtures: Bul. 10-M, Luvex Slimline; Bul. 30-A-3, 85-watt fixtures. Day-Brite Lighting, Inc.

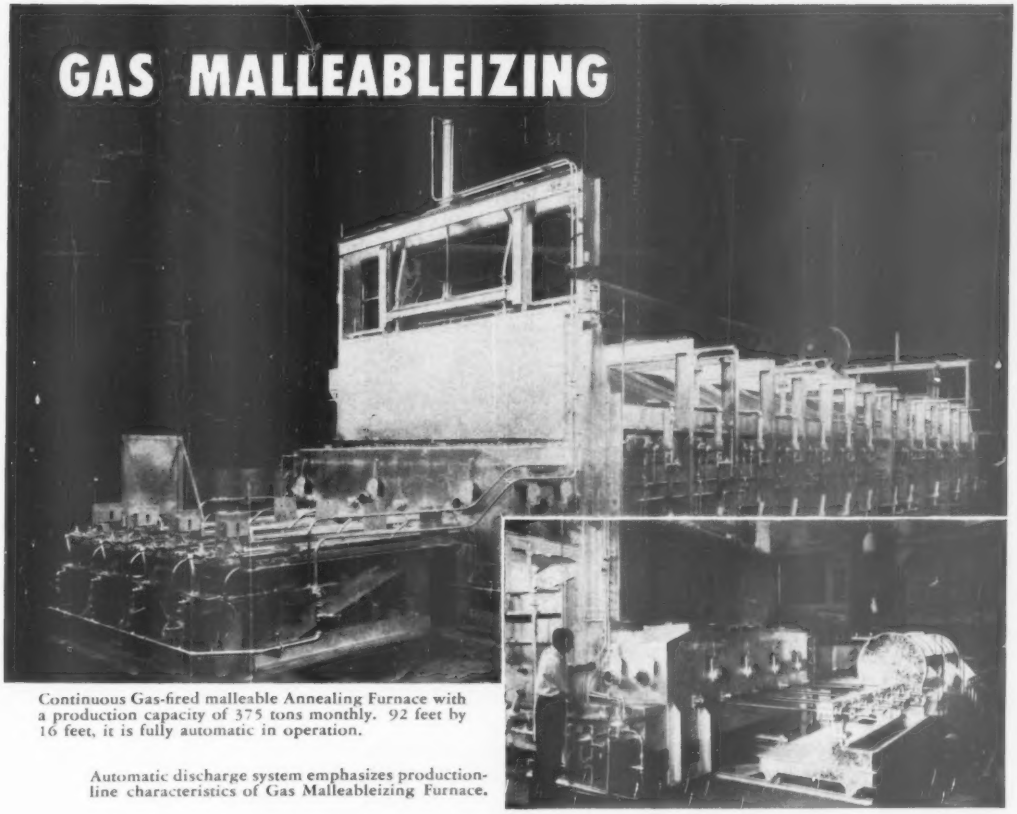
—27—

FLARING TOOL—rolls flares in the air. Operation, features, prices. Also other tubing service tools. Imperial Brass Mfg. Co.

—28—

FLOOD LIGHTS — and reflectors. Cat. FL-49, 46 pp. Illustrations, descriptions of complete line, includ-

GAS MALLEABLEIZING



Continuous Gas-fired malleable Annealing Furnace with a production capacity of 375 tons monthly. 92 feet by 16 feet, it is fully automatic in operation.

Automatic discharge system emphasizes production-line characteristics of Gas Malleableizing Furnace.

Continuous Cycle Annealing

AT WALWORTH COMPANY

DEMONSTRATES PROCESSING SPEED OF *GAS*

MALLEABLEIZING of cupola iron is just one of the production-cycle operations in which GAS demonstrates its economic importance in modern industrial practice.

Factual results of this method of malleable annealing can be found in the records of Walworth Company's foundry at Greensburg, Pennsylvania. The reduction in processing time and the resulting higher strength and ductility are substantial.

But this is only the first savings factor in controlled atmosphere processing with modern Gas-fired furnaces. Other factors include:

- reduction in amount of material tied-up in process
- absolute quality control of resulting product
- elimination of packing operation
- improvement in physical properties averaging 30% due to exact control
- control of malleableizing cycle to conform to production requirements

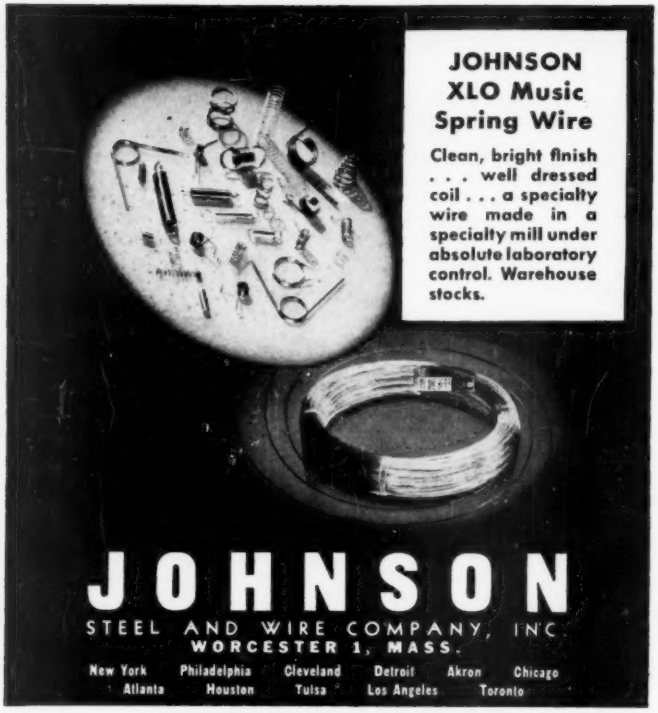
Important advantages, these—each a cost-control factor in the manufacture of Walworth valves, pipe-fittings, malleable castings.

Throughout industry you'll find examples of the economic advantages of GAS and modern Gas Equipment as important as those at Walworth Company. Efficient utilization of GAS in modern heat-processing is worthy of the continuous study your Gas Company Representative will help you make. Call him soon.

MORE AND MORE... THE TREND IS TO GAS

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVE,. NEW YORK 17, N. Y.


JOHNSON
XLO Music
Spring Wire
Clean, bright finish . . . well dressed coil . . . a specialty wire made in a specialty mill under absolute laboratory control. Warehouse stocks.
JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

One man and a C-F Lifter . . .

One man and a C-F Lifter handle the sheet steel stock in and out of storage in this plant with ease, speed and economy. C-F Lifters can pick up, carry and unload more loads per hour using less man and crane time than any other method. Note how closely a C-F Lifter piles sheets—this results in great savings in storage space. Jaw adjustments for carrying different widths of sheets are made in a few seconds by the operator—an important feature when varying sizes of stock are used.

C-F Lifters are made in sizes to handle from 2 to 60 tons in standard and semi-special designs.

Write for the bulletin "C-F Lifters." It illustrates the many cost-saving advantages of these lifters.

CULLEN-FRIESTEDT CO.
1321 S. Kilbourn Ave., Chicago 23, Ill.

HANDLE SHEETS with C-F LIFTERS

ing accessories and spare parts. S & M Lamp Co.

—29—

FLOOR PLATE, STEEL ABRASIVE—Sizes, applications, fabricating data. Gives allowable loads, safety uses. 8 pp. Alan Wood Steel Co.

—30—

GEARS—herringbone, speed reducers and increasers, Cat. G-1, 50 pp. Specifications, pictures, ratings. Lufkin Foundry & Machine Co.

—31—

GENERATORS, AC.—"Your Guide to Profitable Installations of Modern Generators," 8 pp. Electric Machinery Mfg. Co.

—32—

GUIDE, ANCHORING—for expansion joints. Advantages, specifications. Pictures, detail drawings. Piping Specialties, Inc.

—33—

HEATERS, ELECTRIC—Four basic types, models of each, 50-page Cat. 50. Complete, assembled items covered. Edwin L. Wiegand Co.

—34—

INDICATORS, PYROMETER — Dimensional drawings, pictures, descriptions. Other electrical equipment mentioned. Thermo Electric Co., I

—35—

INSU ATIONS, DUCT — "Fiberglas." 12-page bulletin gives properties, applications. Owens-Corning Fiberglas Corp.

—36—

LADDER STEP, SAFETY—of magnesium. Features, illustration, price. The Watson Co.

—37—

LAMPS, AVIATION — "Westinghouse Lamps for Airways, Aircraft and Aerodromes." Tables, illustrations. Westinghouse Electric Corp.

—38—

MACHINE, SNOW REMOVING—Folder describes "Snow-Blo." Illustrations; features described. Sensation Mower, Inc.

—39—

MARKER, CONVEYOR — How to mark each package on conveyor. Features, suggestions for use with conveyor types. Pictures, detail drawing. Algene Marking Equipment, Inc.

—40—

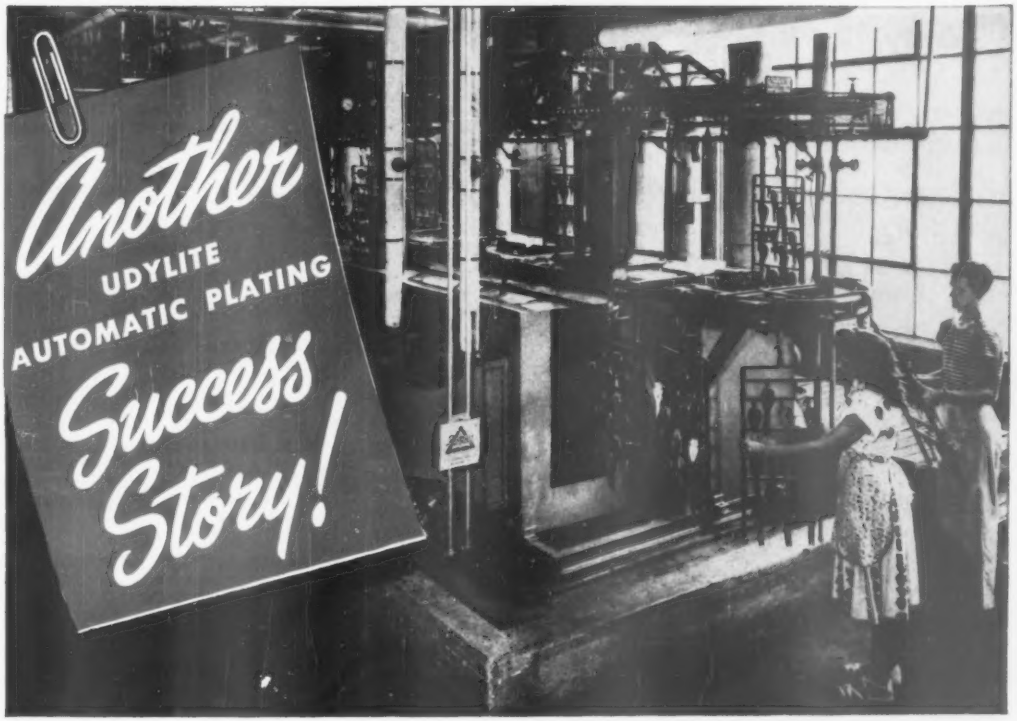
MARKER, WIRE—pipe, cable, conduit, etc. Title, "The Most Effective Wire Marker Ever Devised." Western Lithograph Co.

—41—

MODELS, PLANNING—32 pp. on models, equipment, and tools. Includes case histories. Visual Planning Equipment Co., Inc.

—42—

MODELS, SCALE—8-page bulletin



Production Stepped Up 25%—Now 1500 Parts Per Hour!

240 Man-Hours Saved Per Week!

Quality Improved—Rejects Reduced to ½ of 1%!

for

D. P. HARRIS
HDW. & MFG. CO., Inc.
Makers of the Famous

Rollfast
ROLLER SKATES

● You can get results like these in YOUR plant, just as the Rollfast people did, by a simple and quick conversion to Udylite automatic machines.

You'll be miles ahead by choosing *Udylite*, because of important "hidden" values like these that don't show up in the initial estimate:

No long tie-ups in the plating room during installation—Udylite machines, shipped ready to run, can usually be installed over a week-end, and require but a few machinery movers. These compact machines require less working space, solving the load-and-unload space problem. Racks are within easy reach. And Udylite machines have astonished users with their low maintenance costs.

Write a "success story" like the one above in *your* plant—plan now to "go automatic" with Udylite equipment! We'll be glad to make recommendations, entirely without cost or obligation. Write *today*.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

Only $2.98 helps put new "sell" in television advertising

Sponsor of television show had to refilm his commercials to meet a new selling problem. New films picked up at studio 4 P.M., delivered to TV station 800 miles away 8:47 P.M. same evening. Air Express cost for 11-lb. carton, $2.98. (In *undramatic* fashion Air Express keeps radio, television or any business rolling.)

Remember, $2.98 bought a complete service in Air Express. Rates include door-to-door service and receipt for shipment—plus the speed of the *world's fastest* shipping service.

Every Scheduled Airline carries Air Express. Frequent service—air speeds up to 5 miles a minute! Direct by air to 1300 cities; fastest air-rail to 22,000 off-airline offices. Use it regularly!

Only Air Express gives you all these advantages

Nationwide pick-up and delivery *at no extra cost* in principal towns, cities.

One-carrier responsibility *all the way*; valuation coverage up to $50 without extra charge. And shipments always *keep moving*.

Most experience. More than 25 million shipments handled by Air Express.

Direct by air to 1300 cities, air-rail to 22,000 off-airline offices.

These advantages make Air Express your best air shipping buy. Specify and use it regularly. For fastest shipping action phone Air Express Division, Railway Express Agency. (Many low commodity rates in effect. Investigate.)

SPECIFY AIR EXPRESS

AIR EXPRESS

GETS THERE FIRST

Rates include special pick-up and delivery door to door in principal towns and cities

AIR EXPRESS, A SERVICE OF RAILWAY EXPRESS AGENCY AND THE SCHEDULED AIRLINES OF THE U. S.

lists uses, illustrates them. Raymond A. Lester Associates.

—43—

MOTOR—called Uniclosed, pictured and described in Bul. 1524. Reproductions and progressive drawings. U. S. Electrical Motors, Inc.

—44—

MOTORS—and generators of different types, uses. Illustrated, gives ratings. Century Electric Co.

—45—

OIL CUP AND GAGE—Combination unit described, dimensions given. Illustrated. Trico Fuse Mfg. Co.

—46—

OIL FILTERS—4-page folder describes and illustrates line of oil filters for heavy industry. Lists advantages. Winslow Engineering Co.

—47—

OILS, HYDRAULIC—Bul. SO 10849 gives viscosity index, viscosity SUS, pour point, flash point for many oils, and their uses in hydraulic systems. Hydraulic Equipment Co.

—48—

PACKINGS, PUMP—Bulletins on "Palmetto" packings. Illustrated. Greene, Tweed & Co.

—49—

PIPE—stainless steel or nickel alloy. Bul. 485, "Corrosion Service Piping." Designs, descriptions, weights, sizes. Taylor Forge & Pipe Works.

—50—

PIPE THREADER—portable, called Port-A-Pony. Specifications, features. Thread-Ezy Mfg. Co.

—51—

PRODUCTS, CHEMICAL INDUSTRY—12 products listed. Photographs and drawings. Charts give capacities, ratings, and specifications of various products. Black, Sivalls, and Bryson, Inc.

—52—

PUMPS, CENTRIFUGAL—Bul. 725.3 gives details on stainless steel line. Features, performance, specifications. Goulds Pumps, Inc.

—53—

PUMPS, DOUBLE SUCTION—Single stage centrifugal pumps described in Bul. 955-N, 24 pp. Dimensions, drawings. Buffalo Pumps, Inc.

—54—

PUMPS, SEWAGE—Illustrated, 32-page. Bul. 964-E lists types, dimensions. Buffalo Pumps, Inc.

—55—

REFLECTORS—Porcelain enamel and "Ultranamel." All types listed, specifications given. Steber Mfg. Co.

—56—

RELAYS, MAGNETIC—Seven standard types. Ratings, dimensions, uses, coil specifications. Ward Leonard Electric Co.

—57—

REPAIR CLAMPS—and service fittings for steel and cast iron pipe.

20 pieces per hr. by former method
180 pieces per hr. on the BLANCHARD

Once again Blanchard Surface Grinding increases part output while slashing production costs . . . today's best formula for putting manufacturers in the black.

This time a Blanchard No. 18 with a magnetic chuck was used. A special circular fixture, of laminated construction for magnetic purposes, with 59 spring-loaded locating V's around its outer circumference was designed to hold the work. The unique design of the fixture provided for precise locating, aligning and holding of the fine grain cast iron connecting rods which had to be ground flat and at right angles to the pins — accurate finishing being essential to a later hollow milling operation of the pins.

The combination of the Blanchard's ability to remove stock more rapidly to exact tolerances and the clever holding fixture stepped up production to 180 pieces per hour as against 20 per hour by best other production method.

Here are the part details:

Length of base overall 7¼", width of base—⅞", thickness of base before grinding—7/16", overall length of pins—1¾", rough diameter of pins—⅞", finished diameter of pins—¾". Material removed 1/16" on major portion of base and two cross lugs 1/16" additional.

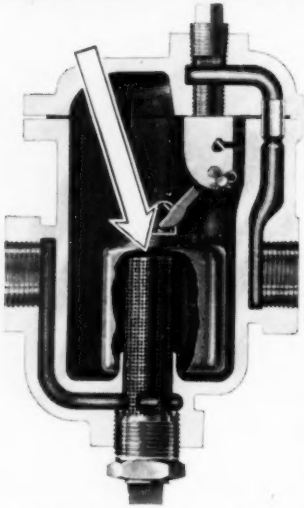
Send for your free copies of "Work Done on the Blanchard", third edition, and "Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

TRANE INDUSTRIAL
Weather Magic

A Tip on BUCKET TRAPS



Protection against dirt and scale is built into Trane's 61S Heavy Duty Bucket Trap

When installing bucket traps for draining high pressure lines, it is standard practice to place strainers ahead of the traps for protection against scale and dirt.

A method of reducing time and material for such installations is through the use of the new Trane 61S Bucket Trap. This 2-in-1 device *has the strainer built into the bottom of the trap.*

The combination is not only lower in first cost than a separate trap and strainer, but is also much easier to install.

Bulletin DS-260, covering the complete Trane line of industrial heating specialties, features "Which Trap Shall I Use?," a section explaining the difference between thermostatic, float, and bucket traps. It tells where to use each type, and why.

A request on your letterhead will bring you a copy of this 60-page data book.

THE TRANE COMPANY
LA CROSSE, WISCONSIN

Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment—Unit Heaters, Convector-radiators, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties . . . In Canada, Trane Company of Can., Ltd., Toronto.

Illustrated 40-page Cat. 41. Also gaskets, special fabricated clamps. M. B. Skinner Co.

—58—

RUST INHIBITORS—"A New All-Star Line-Up of Rust Preventives." Uses, properties of 11 different types. E. F. Houghton & Co.

—59—

SCAFFOLDS, EXTENSION — "Hi-Lift," all-welded steel, hand or electrically operated. Description, photographs, uses. Atlas Industrial Corp.

—60—

SCALES, INDUSTRIAL — "Better Ways to Weigh, Count, Test, Measure, and Control." Different applications, illustrated. Toledo Scale Co.

—61—

SCREWS, ASSEMBLY — "Screwstick," one-piece stick of identical screws. Gives illustrations, diameters available. American Screw Co.

—62—

SCREW STEEL—named Ledloy. Description, advantages, illustrations. Joseph T. Ryerson & Son, Inc.

—63—

SET, BEARING EXTRACTOR—for motor bearings up to 4 inches. Features, description, price. Walco Electric Products Co.

—64—

SHAFT SEAL, MECHANICAL—for leak prevention around a rotating shaft. Types, uses. Food Machinery and Chemical Corp.

—65—

SHEARS, POWER—for light sheet metal. Bul. 71-1 gives features, specifications. Niagara Machine & Tool Works.

—66—

SHOCK ABSORBERS—Bulletin describes 4 models as to features and dimensions. R-S Products Corp.

—67—

SHOVEL FRONT—½ cu. yd. capacity. Features, specifications, dimensions. Hyster Co.

—68—

SLING CHAINS—Wall chart simplifies selection, gives performances, sizes for alloy steel and iron sling chains. McKay Co.

—69—

SLUDGE DISSOLVER—Fuel oil additive, called Houghto-Solv. Functions, photographs. E. F. Houghton & Co.

—70—

SNUBBER, PRESSURE GAGE—for protecting gages from vibration. Description, adjustments. Bul. 380. Parker Appliance Co.

—71—

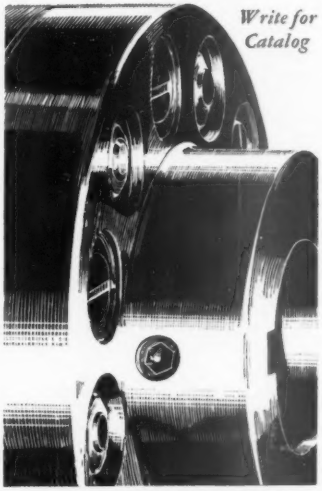
STANDS AND CABINETS—Reproductions, uses, specifications of several types. Prices with and without casters. Monarch Metal Products, Inc.

—72—

STARTER, FULL VOLTAGE—Type 371, wall mounted, oil immersed. Di-

AJAX FLEXIBLE COUPLINGS

Standard Equipment on America's finest Direct-Connected Machines



Write for Catalog

AJAX FLEXIBLE COUPLING CO. INC.
WESTFIELD, NEW YORK

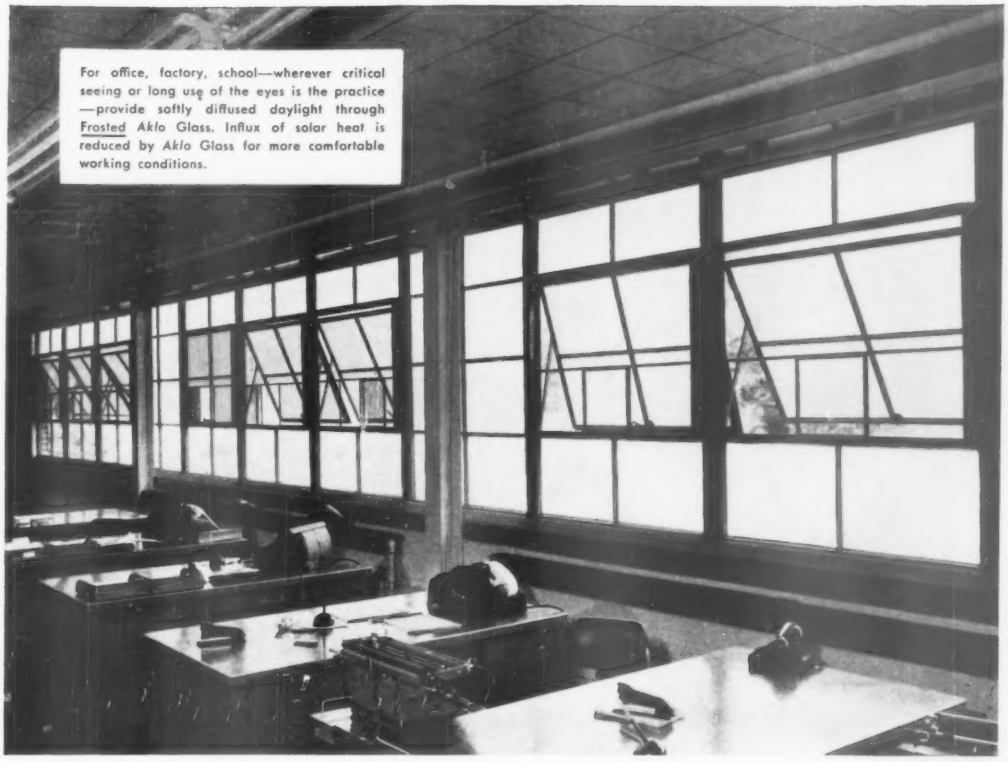
NEW
SILICONE-BASE
HEAT RESISTANT FINISH

MICO Aluminum hailed by leading manufacturers as the most heat-stable finish ever to be developed for every day commercial use.

NOW—a heat resistant finish that protects—*virtually doubles the life*—of vital parts in hundreds of products like mufflers, engines, boilers, ovens, oil and gas burners. MICO Aluminum has passed 23 different tests for thermal, chemical, and physical stability, and has thoroughly proved itself on the production line. *Investigate* MICO. *Get the facts!* Write today for your copy of the new MICO folder . . .

MICO . . . THE SILICONE BASE FINISH THAT WITHSTANDS 1000° (F.)—WITHOUT SURFACE BREAKDOWN.

Manufactured Exclusively by
MIDLAND INDUSTRIAL FINISHES COMPANY
Dept. FM-12 Waukegan, Illinois
ENAMELS · SYNTHETICS · LACQUERS · VARNISHES


For office, factory, school—wherever critical seeing or long use of the eyes is the practice—provide softly diffused daylight through Frosted *Aklo* Glass. Influx of solar heat is reduced by *Aklo* Glass for more comfortable working conditions.

Lighting at its best...FILTERED DAYLIGHT

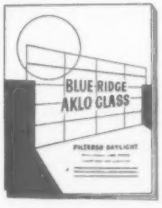
There's no substitute for properly diffused daylight. With Blue Ridge Frosted *Aklo** Glass in windows you provide daylight of pleasing quality that is easy on the eyes. Workers—in office or plant—enjoy an abundance of softly-diffused daylight without excessive solar heat.

REDUCES GLARE. Frosted *Aklo* Glass is a blue-green diffusing filter between the sun or sky and the eyes of workers. *Aklo's* glare reduction makes seeing more comfortable—less tiring. Easier seeing means better workmanship—faster production—fewer accidents.

RETARDS SUN HEAT. *Aklo* Glass absorbs nearly all the infrared radiation of the sun and re-radiates much of it externally. Interiors stay cooler, providing more comfort and permitting lower air-conditioning costs.

Aklo Glass is manufactured by the Blue Ridge Glass Corporation of Kingsport, Tennessee, and sold through Libbey·Owens·Ford Glass distributors. To see for yourself how Frosted *Aklo* Glass reduces glare and sun heat, ask your distributor for a Radiometer demonstration.

Free Book on Reduction of Sun Glare and Heat.
Write to Blue Ridge Sales Division, Libbey·Owens·Ford Glass Company, 90129 Nicholas Building, Toledo 3, Ohio. *®



BLUE RIDGE AKLO GLASS

Heat Absorbing • Glare Reducing • Figured and Wire Glass

Minutely precise planning

is vital in RECOVERING VALUABLE

Butterfly net promises

to catch everything are unrealistic in trapping fines, ultra-fine and finer-than-that in dust particles. But Buell adjusts its equipment *and your costs* to do a maximum job where results are tangible. No guesswork, no overall assumptions; but a special laboratory analysis of your dust into fractions of different micron-size grading—and a guaranteed performance on each fraction . . . Scientifically arrived-at assurance of potential results is a fundamental part of Buell's engineering service. It is freely available, with no obligation whatsoever. Bring us your problems . . . or, as a preliminary, let us send you 'Engineered Efficiency in Dust Collection'. Write: Buell Engineering Company, 70 Pine Street, Suite 5020, New York 5, N. Y.

buell

Engineered Efficiency in

DUST RECOVERY

Manufacturing in the United States and Canada for shipment throughout North and South America.

mensions, wiring diagram. 4-page Bul. 14B7274. Allis-Chalmers Mfg. Co.

—73—

STORAGE CONTAINERS — Tote boxes, tote units, taper pans, tool boxes. Sizes and uses of each. All Steel Equipment Inc.

—74—

SWEEPERS, FLOOR—Descriptions, features, specifications. Models 20, 28. Handling Devices Co., Inc.

—75—

SYSTEMS, COAL HANDLING AND STORAGE—14 case histories. Basic designs, adaptations. Bul. 300. Gifford-Wood Co.

—76—

SYSTEMS, TELEMETERING — for electric power distribution and industrial uses. 20 pp., illustrated Bul. GEA-5233. General Electric Co.

—77—

TACKER, STAPLE—Model T-5, trigger action. Operation, sizes, uses, illustrated. Bostitch.

—78—

TAPE, ELECTRICAL—used without other insulating materials. "Scotch" type. Descriptions, characteristics, pictures, applications. Minnesota Mining & Mfg. Co.

—79—

TELEPHONES—sound powered by voice of user. Applications, features, types, specifications. U. S. Instrument Corp.

—80—

THERMOMETERS, INDUSTRIAL—Bul. E lists tabular, sectionalized data on liquid-in-glass types. Applications, description of various models. Precision Thermometer and Instrument Co.

—81—

TOOLS—Supplement No. 1 [illegible]or Cat. GT-200. 16 pp. Stocks, spec[illegible]ations, prices. Carboloy Co., Inc.

—82—

TOWERS, WATER COOLING—Operating and maintaining them. Includes inspection, lubrication, shutdown. C. H. Wheeler Mfg. Co.

—83—

TRANSFORMER, AIR-COOLED — Cat. AC 178 gives specifications, 1/10th to 50 kva. Describes improvements. Wiring diagrams, charts, uses. Acme Electric Corp.

—84—

TRUCK, MATERIALS HANDLING —Features, specifications, capacity, various uses. Illustrated. Kalamazoo Mfg. Co.

—85—

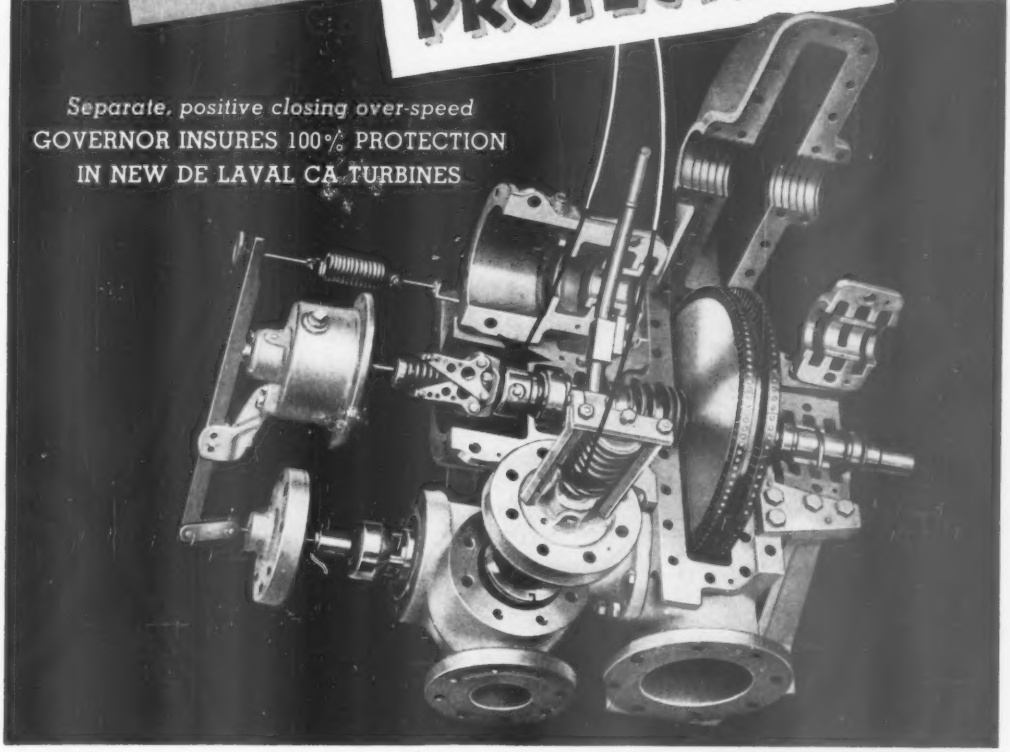
TUBING, HYDRAULIC — Bul. 38 lists stocks, uses, specifications. Superior Tube Co.

—86—

TURBINES, MULTI-STAGE—24 pp. Cat. 4200, illustrated. Features, suggested applications. De Laval Steam Turbine Co.

DOUBLE PROTECTION

Separate, positive closing over-speed
GOVERNOR INSURES 100% PROTECTION
IN NEW DE LAVAL CA TURBINES



The design of the new De Laval CA Turbine assures positive over-speed protection and unfailing emergency shut-off under any and all conditions.

In the CA Turbine, operation of the over-speed governor and emergency trip valve is in no way inter-dependent upon the operation of the normal speed governor or any other part of the turbine. A sticky governor valve cannot jeopardize its operation.

The functioning of the emergency trip valve is quick and sure. The stem of the valve rides freely without packing friction in a closely machined rust-resisting nickel-iron bushing. The valve closes against a single seat with the steam pressure acting on top of the valve to keep it tight. Foreign matter is kept away from the valve seat by a strainer in the steam line.

For double protection, specify the new De Laval CA Turbine.

Before you buy a turbine, be sure and get complete information on these additional De Laval features:

- ✓ True center line support and flexible mounting for perfect alignment.
- ✓ A choice of eight governors.
- ✓ Balanced double-seated bonnet-type governor valves for close control of steam flow.
- ✓ Sensitive, friction-free, wear-resistant "rocking chair" governor pivots. Super-smooth, chrome plated shaft journals make carbon rings last longer.
- ✓ The casing and bearings split horizontally at center line for easy removal and inspection of the rotor, carbon rings and bearings.

Send for Catalog 4202-22-J

DE LAVAL STEAM TURBINE COMPANY, TRENTON 2, NEW JERSEY

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS • CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

NOW... YOU CAN CUT EQUIPMENT INSTALLATION COSTS!

WITH SMOOTH CEILINGS SYSTEM OF FLAT SLAB CONSTRUCTION

NOTE: In the illustration below; conveyors, blowers, pipes and conduit hung without dodging or cutting through beams, panels or flared column caps.

SPECIAL STEEL GRILLAGES employed in this system are embedded in Concrete slabs. They eliminate flared caps, drop panels and beams. Use with structural steel, steel pipe or concrete columns. Eliminate waste space and ceiling height . . . cut equipment installation as well as overall construction cost.

COMPARE Smooth Ceilings System . . . See how you can save!

WRITE FOR FREE DESCRIPTIVE BULLETIN NOW!

SMOOTH CEILINGS SYSTEM
802 Metropolitan Life Bldg., Minneapolis 1, Minn.

TURN TO PAGE 281

where you will find the WHERE-TO-BUY SECTION of FACTORY MANAGEMENT and MAINTENANCE. Many invaluable ideas for cutting costs, boosting production or improving all around efficiency in your plant may be gathered from these small advertisements.

It's a good habit — one that will pay off in dollars and cents — to read the WHERE-TO-BUY SECTION every month.

—87—
TURNTABLES—pressed steel, supplied with single or double set of rails. Bul. 48, 4 pp., illustrated. Hardinge Co., Inc.

—88—
UNLOADER, DIE—accessory for lift trucks. Description, features, specifications. Towmotor Corp.

—89—
VALVES—4-way control, pilot operated, solenoid controlled. Specifications, types, prices. Bul. 1044. Crescent Valve Co.

—90—
VALVES—fittings, and primers. Profile and cutaway illustrations. Operating data. Kohler Co.

—91—
VALVES—narrow, face-to-face, 50-lb. especially for hydraulic use. Descriptions, illustrations. R-S Products Corp.

—92—
VALVES, STANDARD AIR—for remote control of single- and double-acting air cylinders. Stock and order sizes. Design, specification, detail drawings, pictures. 12 pages. The Bellows Co.

—93—
VAPORIZER, GLYCOL—Called Vapomatic, is described with uses in bulletin, "Cross Infection Control." M. F. Robertson Sons, Inc.

—94—
VARNISH, INSULATING—Care of DC 996 Silicone Varnish. Properties, specifications. Dow Corning Corp.

—95—
VENTILATORS, PORTABLE—Features, uses, specifications. Pictures. Mine Safety Appliance Co.

—96—
WELDING ACCESSORIES — Descriptions, specifications, prices. Photographs, sketches diagrams. Bu. GEA-253-A. General Electric Co., Welding Div.

—97—
WELDING PRODUCTS — "Selector and Comparison Chart," Bul. CC-3. Type of service each welding rod and electrode is for. Metallurgical and physical descriptions of each. American Brake Shoe Co.

98—
WHEELS, ABRASIVE — for grinders, cut-off machines, saws, sanders, Straight and disk types. Description, performance, speeds, sizes, grits. Also points, sticks, adaptors, guards. Bay State Products Co.

—99—
WINDOWS, METAL LOUVER—mechanically operated. Features, specifications, sizes, detail drawings. The Stewart Iron Works Co., Inc.

—100—
WIRE ROPE—stainless steel and monel metal. Uses, constructions, breaking strengths, weights. Macwhyte Co.

Insulux is easy to install on sash replacement jobs!

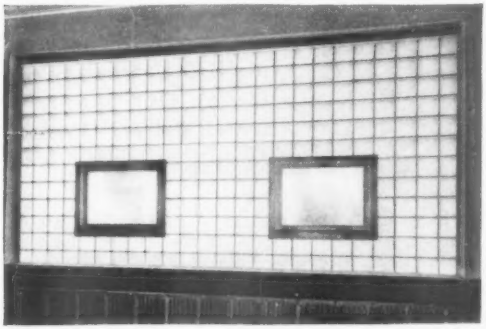
Sash Replacement Step by Step . . .

1 Typical maintenance problem: windows broken, sash rusted and in need of repair again. Workmen remove old windows while tarpaulin protects interior of building from weather.

2 Chase is cut at top and sides of masonry opening and (in this case) a new sill is installed to receive Insulux *light-controlling* Glass Block panel.

3 Insulux Glass Block is easily installed in same manner as for new construction. Panels are ideal where interior-controlled conditions are necessary.

4 Complete Insulux panel provides a permanent "wall of daylight." Insulux panel keeps out dirt, dust; keeps interior cooler in summer and warmer in winter.



5 Where ventilation is desired, ventilators or small windows of various types may be set into the glass block panels.

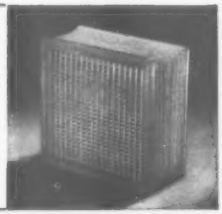
• • •

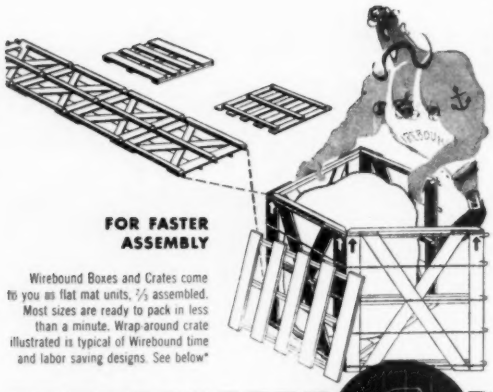
For further information, check classified pages of telephone directory under "GLASS," or write American Structural Products Company, Dept. F-31, P. O. Box 1035, Toledo 1, Ohio.

INSULUX
GLASS BLOCK ®

AMERICAN STRUCTURAL PRODUCTS COMPANY

Subsidiary of
OWENS-ILLINOIS GLASS COMPANY





FOR FASTER ASSEMBLY

Wirebound Boxes and Crates come to you as flat mat units, ⅔ assembled. Most sizes are ready to pack in less than a minute. Wrap-around crate illustrated is typical of Wirebound time and labor saving designs. See below*

FOR ESSENTIAL PROTECTION

Time-tested, resilient Wirebounds combine the strength of steel with thinner wood. Thickness of boards, arrangement of reinforcing battens, style of cleats, and number and gauge of wires vary with the type and weight of product carried. See below*

FOR LOWER COSTS

A typical user reports Wirebounds reduce tare weight 33⅓%, provide over-all shipping room savings of 25%, slash storage requirements 80%, cut assembly and packing time 50% Wirebounds will deliver your goods safely and at lower cost.*

USE

Wirebound

BOXES & CRATES

FOR LOWER TOTAL SHIPPING COSTS

60 Wirebound Plants throughout the United States

***Send for free book** . . . contains complete details of Wirebound advantages, technical features and describes how Wirebounds are designed specifically to meet your requirements. Mail coupon today!*

Wirebound Box Manufacturers Assn., Room 1838, Borland Bldg., Chicago 3, Ill.

☐ Send Booklet of Product Information ☐ Send a Sales Engineer

NAME

COMPANY ADDRESS

CITY ZONE STATE

OUR PRODUCT IS

Automatic serve-up packages

New! Industrial Tissues

For Wiping and Polishing

Wiping precision instruments

Let clean, *disposable* KIMWIPES* industrial wiping tissues standardize — and economize — your cleaning operation. Soft, yet strong, they're ideal for cleaning precision tools and instruments. Recommended for use on finely finished surfaces. And highly absorbent KIMWIPES remove dust, dirt, grease and oil — quickly, safely.

Polishing machined parts

For further information and the name of the KIMWIPES distributor nearest you, write us on your business letterhead. Address Kimberly-Clark Corporation, Creped Wadding Division, Neenah, Wisconsin, U. S. A.

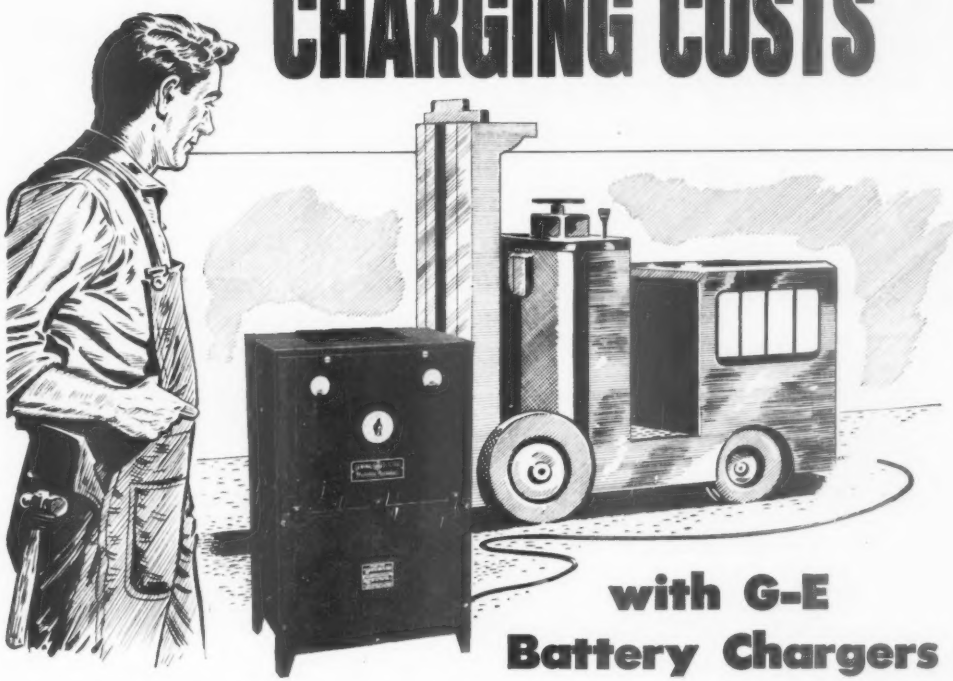
Kimwipes*

INDUSTRIAL WIPING TISSUES

*T. M. REG. U. S. AND CAN. PAT. OFF.

A PRODUCT OF Kimberly Clark

GET LOW ELECTRIC-TRUCK CHARGING COSTS



with G-E Battery Chargers

- **Low Current Costs**

The heart of the G-E Battery Charger is its copper-oxide rectifier stack—proved highly efficient throughout a virtually unlimited life.

- **Low Maintenance Costs**

Nothing moves except a fan, requiring only occasional lubrication—plus full protection against both mechanical and electrical failures.

- **Low Labor Loss**

Spotting these economical chargers throughout a plant means no long wasteful excursions to charging areas. No waiting for an expert to hook up charging apparatus. Special training or skill is not needed to use a G-E Battery Charger. It's simple—automatic.

- **Low Battery Costs**

Two-rate charging safely brings batteries up to full charge. Starting with a fast charge when the battery is in a discharged condition the battery charger rapidly builds up a substantial charge then automatically tapers off to a slow, safe finishing rate. This safe, gentle handling during charging helps batteries maintain their full rated service life.

For complete details see your local electric truck dealer or write Apparatus Department, General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

456-202

UNISTRUT
all purpose metal framing–

NEW IDEA BOOK FOR PLANT OPERATING MEN, POWER AND DESIGN ENGINEERS, MAINTENANCE MEN AND CONTRACTORS

FREE ON REQUEST

SIMPLE AND COMPLETE, EASY TO USE

SHOWS DETAILS OF PRODUCT AND APPLICATIONS . . . HOW TO ORDER

THE MOST PRACTICAL AND USEFUL IDEA BOOK YOU'VE EVER PUT TO WORK!

Here are 24 pages packed with pictures, data and detailed information on how to build frames, hangers and supports for electrical, plumbing, heating and air conditioning equipment of all kinds, the fast, easy economical Unistrut way.

Write for your copy of Catalog 500 — fill in coupon and mail today!

DEPT. 90
UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd. Chicago 7, Ill.

Please send me your new Unistrut Catalog No. 500, without obligation.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

U. S. Patent Numbers

2327587	2363382
2329815	2380379
2345650	2405631

Representatives in Principal Cities

ALL PURPOSE UNISTRUT METAL FRAMING

LOCK JAW
Stops SHIMMYING
BUCKLING
YAWING

All-purpose work clamps NOW in two sizes

Set-ups stay put when **Lock Jaw** grips with both downwards and sideways pressure . . . grip is sure, powerful, self-locking . . . eliminates cumbersome bolting and clampings . . . saves time and work spoilage. Use **Lock Jaw** on planers, radial drills, shapers, milling machines, surface grinders, boring mills and lathes.

Two sizes: Model B for large tables: New, lighter Model A where table space is limited. Interchangeable jaws to fit work contours.

Write today for Bulletin 140-A

RIVETT

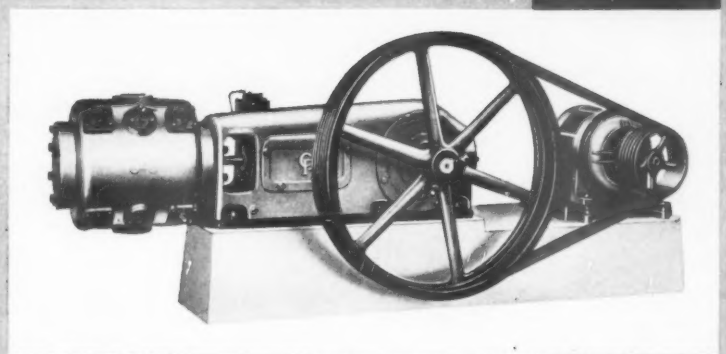
RIVETT LATHE & GRINDER, INC.
BRIGHTON · BOSTON · MASSACHUSETTS · U. S. A.

A GOOD JOB
for some FACTORY reader

. . . who is equipped by education and experience for a key position on the editorial staff of a leading management magazine. He must have at least 5 years of production experience. He probably has an engineering degree. He is certainly interested in scientific management and familiar with the modern techniques of plant layout, mechanical handling, work simplification, production planning and control, etc., etc. He undoubtedly has a good job right now. He has probably never thought of himself as a journalist, or a writer, or an editor—but he *does* know how to write simple reports on current production problems. Age, 35-40. Salary, $10,000.

P-1490
Factory Management & Maintenance
330 W. 42nd St., New York 18, N. Y.

years of satisfactory service prove dependability of Type T



This horizontal, straight-line, double-acting, moderately rated compressor is noted for continuous, economical operation . . . low maintenance . . . long life.

Its special features include Simplate valves . . . liberally water-jacketed cylinder and heads . . . adjustable, tapered roller main bearings . . . double-counterweighted crankshaft.

CP Type T Compressors are furnished in single stage units from 89 to 1937 c.f.m., 15 to 125 H.P., with V-belt, flat belt, and direct-connected synchronous motor drive. Multi-stage designs for pressures up to 5,000 pounds, and steam-driven types are also available.

Write for Bulletin 728-7.

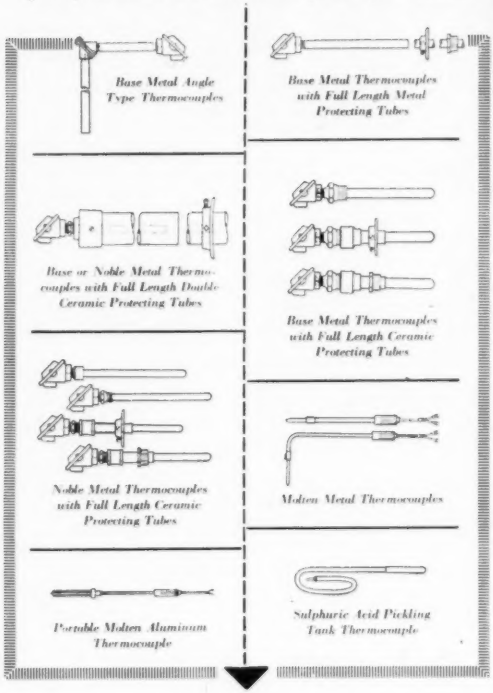
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Standardize on BROWN Pyrometer Supplies

It costs no more to use the best pyrometer supplies . . . the Brown name is your assurance of highest quality in materials, workmanship and specification.


Base Metal Angle Type Thermocouples
Base Metal Thermocouples with Full Length Metal Protecting Tubes
Base or Noble Metal Thermocouples with Full Length Double Ceramic Protecting Tubes
Base Metal Thermocouples with Full Length Ceramic Protecting Tubes
Noble Metal Thermocouples with Full Length Ceramic Protecting Tubes
Molten Metal Thermocouples
Portable Molten Aluminum Thermocouple
Sulphuric Acid Pickling Tank Thermocouple

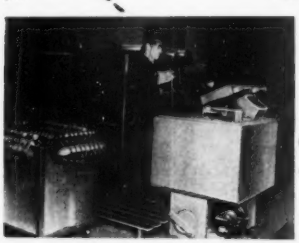
In addition to a variety of thermocouple assemblies the Brown Line includes a wide range of thermocouple elements, terminal blocks, metal and ceramic protecting tubes, insulators, thermocouple wire and extension leadwire.

It will pay you to *standardize on Brown pyrometer supplies.* Call in your local Brown engineer, today . . . for a discussion of your needs, or write for Catalog 100-2.

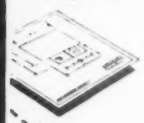
MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4461 Wayne Ave., Philadelphia 44, Pa.
Offices in principal cities of the United States, Canada and throughout the world

Honeywell — *Advanced Instrumentation* FOR BETTER PROCESSING — BROWN

TOP PERFORMANCE WITH AJAX TAMA-WYATT INDUCTION FURNACES for Aluminum Alloys



Ajax Induction Holding Furnace at Mid Western Die Casting Co. Chicago, Illinois



★ BETTER PRODUCTION THROUGH TOP PERFORMANCE IS THE AJAX RECORD

Ajax-Tama-Wyatt induction furnaces are used in the United States and abroad for melting and holding aluminum alloys in die casting, permanent mold, and sand foundries.

No flux or mechanical stirring is necessary. The metal is in constant gentle circulation assuring complete blending of alloys, and a uniform temperature throughout the metal.

Electric energy costs less than fuel and avoids danger of overheating. Completely automatic temperature controls hold metal to within 5°F., at the lowest possible temperature for perfect casting. With an Ajax the yield for perfect castings is exceptionally high.

There are no fumes and operation is practically noiseless. Shops are cooler, more comfortable—manpower efficiency is increased. Shop space is increased, for an Ajax Holding Furnace takes an average of 30 to 40 per cent less floor space than any other furnace.

The Ajax companies have been pioneers in induction melting of metals since the first World War. To date they have installed more than 400,000 KW. of furnace capacity in the United States alone. This is the background of experience behind every Ajax installation.

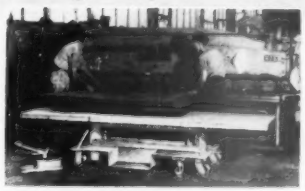
AJAX ENGINEERING CORPORATION
TRENTON 7, NEW JERSEY

AJAX TAMA-WYATT — **INDUCTION MELTING FURNACE**

Ajax Metal Company, Ajax Electrothermic Corp., Ajax Electric Co. Inc., Ajax Electric Furnace Corp.

Material Handling — At the Machine

Proper "Positioning" saves unnecessary handlings . . .



When feeding sheets to Press or Shear, "Position" them with

LYON-Raymond Hydraulic Elevating Sheet Feeding Table

- **Increases feeding speed — • Lessens spoilage**
- **Reduces fatigue—eliminates tiresome, awkward positions**
- **Insures safety—does away with much manual lifting from unsafe positions**

For more particulars on sheet or strip feeding, write for Bulletin 261. Also ask for booklet — "Material Handling — At the Machine." This booklet contains many other illustrations of "positioning" of other products.

LYON-Raymond CORPORATION
Electric Power Trucks . . . Skid and Pallet Lifts
Hydraulic Elevating Equipment
Positioning . . . Sheet and Die Handling

3223 Madison St. GREENE, N.Y.

For Your
REFERENCE FILE

FACTORY offers the following reprints. They treat, concisely and authoritatively, subjects of vital importance under today's conditions of production and employee relations.

PRICE 35 CENTS EACH

(Postpaid)

7. Quality Control
9. Motion Economy
43. A Point Plan for Rating Jobs
38. How to Rate Jobs and Men
45. Foremanship Fundamentals
47. The Foreman On His Job
64. Organization and Control of Mass Production
70. Set Up a Manpower Control Program
78. Provide Adequate Electrical and Mechanical Services
86. Motion-Time Standards
87. Low-Cost Power for Low-Cost Products
90. Standardized Factory Facilities
96. Air Conditioning
99. Lubrication
100. Production Planning
101. Your Electric Motor
102. When Foreman Deals With Worker
103. Fire-Fighting Equipment
104. Plant Lighting
105. Variable-Speed Drives
106. Better Vision for Greater Efficiency
107. Revamping Electrical Distribution Systems
108. Trolley Conveyors
109. Methods-Time Measurement
111. What Electric Distribution System For Your Plant
112. The Management of Maintenance
113. Principles of Maintenance Control
114. Preplanning for Plant Location
115. Profit Sharing Plans in Industry
116. Maintenance Paperwork
117. How To Plan and Run Open House
118. Painting the Plant
119. How to Organize for Cost Reduction
120. Electric Motor Controls
122. Controlling Breakeven Points
123. Carrying out a Methods Improvement Program
124. Making Fullest Use of Electrical Equipment
125. Adopting the Best in Plant Layout
126. Providing Favorable Working Conditions
127. Make Your Plant a Safe, Pleasant Place to Work
128. Providing the Best in Employee Training

12-49

MAIL THIS COUPON

Editor, FACTORY
330 West 42nd St., New York 18, N. Y.

Please send me ..... copies each of the reprints represented by the numbers circled, at 35¢ per copy. I enclose check ( ), money order ( ), for $.....

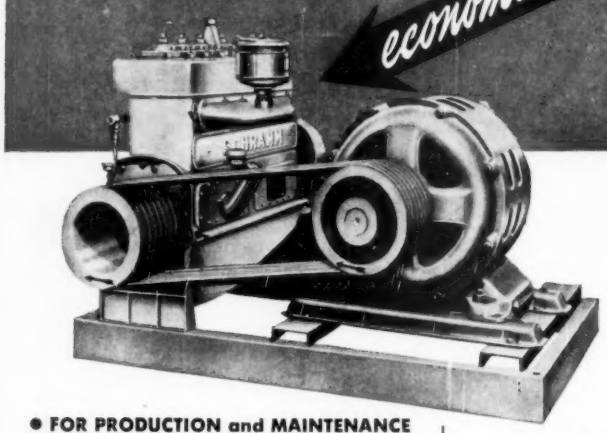
Name .....

Address .....

City ..... State .....

3, 7, 9, 38, 43, 45, 47, 64, 70, 78, 86, 87, 90, 91, 96, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 122, 123, 124, 125, 126, 127, 128

MORE AIR economically!



- **FOR PRODUCTION and MAINTENANCE**
- **FOR SPEEDY PNEUMATIC TOOLS**

SCHRAMM INC. offers a complete line of Industrial Compressors in sizes ranging from . . . 2 to 600 cubic feet displacement . . . Built and designed for continuous heavy duty service with a minimum of attention.

Available in "V" or Flat Belt Drive . . . on base for belt drive from motor or engine . . . or, with direct motor drive. No special foundation required . . . can be bolted to any substantial floor.

Where running water is not available the SCHRAMM Cooling Unit will prove adequate under severest conditions. Accessories essential to any modern industrial installation can also be provided.

Write for Bulletin #4910.

Important Features

- Compact . . . Easy To Install
- Mechanical Intake Valve
- Force Feed Lubrication
- 100% Water Cooled
- Electric Push Button Starting
- En Bloc Construction
- Easy Accessibility
- Vibrationless
- More Bearing Surface

SCHRAMM INC.

THE COMPRESSOR PEOPLE

•

WEST CHESTER PENNSYLVANIA

How to read with your eyes open for business!

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off – by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyer's guide. Read the ads as well as the articles. That's reading with your eyes open for business.

HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

F-24

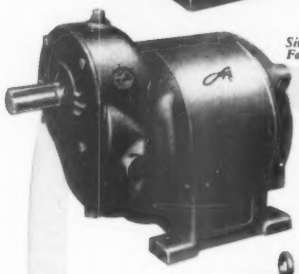
FOOTE BROS. – LOUIS ALLIS

gearmotors

OFFER INDUSTRY

Compactness
High Efficiency
Long Life

Double Reduction
Foote Bros.-Louis Allis Gearmotor



Single Reduction
Foote Bros.-Louis Allis Gearmotor

Triple Reduction
Foote Bros.-Louis Allis Gearmotor

● Here is the new line of Foote Bros.-Louis Allis Gearmotors—modern in design, compact, efficient. Engineered to offer the maximum in performance—in year-in, year-out service—in minimum maintenance.

The units are powered by Louis Allis motors famous for quality for three generations.

A wide range of sizes and ratios is available in single, double and triple reductions in ratings of 1 h.p. through 75 h.p. with open drip-proof, enclosed, splashproof and explosion-proof motors.

These compact drives are engineered to occupy a minimum space, and the husky shafts and bearings permit large overhung load capacities.

Housings are sturdy castings—streamlined inside and out—and are designed for proper lubrication of gears and bearings.

Hardened helical gears are of highest quality. Extreme precision assures long, satisfactory service and quiet operation.

See your Foote Bros. representative or mail the coupon for information.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. O, 4545 South Western Boulevard, Chicago 9, Illinois

Foote Bros. Gear and Machine Corporation
Dept. I, 4545 S. Western Blvd., Chicago 9, Illinois
Gentlemen:

Please send me information on Foote Bros.-Louis Allis Gearmotors.

Name.....

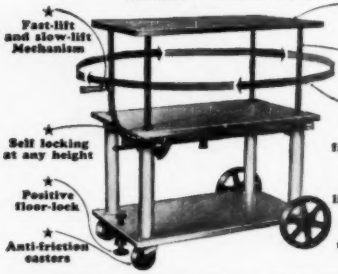
Company.....

Address.....

City.....*State*.....

UP YOUR PROFITS DOWN YOUR COSTS

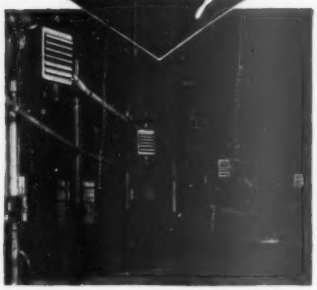
PORTELVATOR
the
HANDY HAMILTON
PORTABLE ELEVATING TABLE


★ Fast-lift and slow-lift Mechanism
★ Three table surfaces
★ Four point support
★ May be worked-at from all sides
★ Self locking at any height
★ Positive floor-lock
★ Anti-friction casters
★ One man can safely lift and carry loads usually requiring the strength of four

ELEVATES • LOWERS • TRANSPORTS
Table locks securely wherever stopped.
WILL NOT TIP OR SLIP
A work bench when and where you need it.
WRITE FOR BULLETIN
giving detailed data
DO IT NOW
You may need this handy helper soon

THE Hamilton TOOL COMPANY
906 HANOVER STREET · HAMILTON · OHIO · U · S · A

FOR HIGH OR LOW Ceilings



Showing installation of Fedders Unit Heaters in large railway maintenance machine shop.

Fedders Series 15 Horizontal Unit Heaters are built in capacities up to 1000 EDR.

• You will find it easier to standardize on the complete line of Fedders Horizontal and Downblow Unit Heaters for normal and high ceiling installations.

Customer satisfaction is assured wherever Fedders Unit Heaters are installed to meet the exacting conditions of industrial and commercial heating requirements everywhere.

Whether ceilings are high or low specify Fedders.

WRITE FOR CATALOGS.

FEDDERS - QUIGAN
CORPORATION
Dept. F-H3
BUFFALO 7, N. Y.

A Great Name Since 1896

fedders

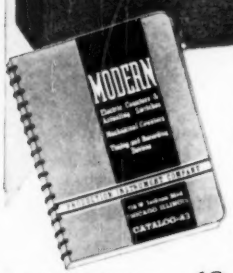
Automatic BATCH COUNTERS

Count Batches of anything that will operate a switch, relay or photo electric unit.

Count Batches continuously without interrupting production and without missing a count — or STOP machine, conveyor, and other equipment at completion of BATCH Count.

Any Batch Quantity quickly and easily selected by turning dials.

May be located at any distance from source of count.



Catalog of Modern Counting Devices for all applications. Send for your copy.

Now you can count exact BATCH quantities of pieces, parts, pills, or exact lengths of wire, paper, etc., without interrupting production and without missing a count — or automatically stop delivery or loading conveyors, imprinting presses, machines, etc., at exact quantities.

Eliminates element of human error, avoids customer complaints, loss and waste. Saves time and cuts labor cost. Thousands in use. Wide flexibility of application. Send for Bulletin MBC-52.

Production Instrument Company
700-06 W. JACKSON BLVD., CHICAGO 6, ILL.

REPRESENTATIVES IN PRINCIPAL CITIES

WHERE TO BUY

featuring many cost-cutting products to help solve production problems

SAUEREISEN No. 1500
Refractory Insulation
It's New! It's Better! Can be troweled or molded to any shape. Light weight. Superior for manufacturing or construction use. Trial Order, 10 lb. lot @ $2.5
Sauereisen Cements Company • Pittsburgh 15, Pa.

Cut Costs! New, bigger values in . . .
HOBART
ARC WELDERS
FREE catalog. A.C., D.C., Heliarc, Elec. or Gas Eng. Drive
HOBART Brothers Co., Troy 5, Ohio
"One of the world's largest builders of arc welders"

Install VAUGHAN
Type A47. British Made
TRIPLE GEARED PULLEY BLOCKS for BETTER MATERIALS HANDLING
EASY OPERATION
ALL GEARS ARE ENCLOSED INCLUDING HAND CHAIN WHEEL
CAPACITIES ½, 1, 2, 3 TONS.
DISPATCH IN 14 DAYS from
THE VAUGHAN CRANE COMPANY LTD
MANCHESTER 12 ENGLAND

For "IN-LINE" PRODUCTION
THE Jacques "BENCH SHEAR 24 to 120"
HOBBS MFG. CO.
Worcester 5, Mass.
EST 1882

more than

51,900

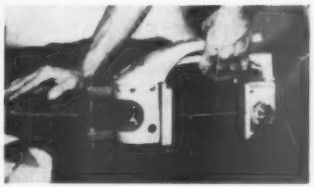
subscribers of FACTORY MANAGEMENT and MAINTENANCE—the vital plant operating group—will see these pages. If you have a product that will help cut costs, increase production or overall plant efficiency advertise it here for their consideration.

EQUIPMENT NEWS

(Continued on page 190)

ametral pitch setups. The 60-feed box includes all standard threads, and any of the optional ranges have 11½- and 27-pitch among others.

The Springfield Machine Tool Co., Springfield, O.

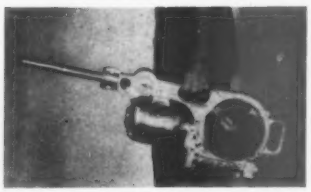


Portable Spot Welder

You can take this Big Shot portable spot welder right to the job instead of bringing the work to it. Its maker says it will weld as quickly and efficiently as any big stationary spot welder, and that the 110-volt units will weld two sheets of any weldable steel 20 to 18 gage, galvanized iron, monel and Hoskins alloys, and stainless steel. The 220-volt unit welds up to ⅛-in. thickness.

The unit weighs 22 lbs., measures 4x4x15 inches. Its rounded nose, top, and sides make it easy to use in hard-to-reach places. You can operate it with one hand, leaving the other free to position the work. It is equipped with a Modulator power control which can be adjusted to varying power conditions.

Tool & Equipment Distributors, 636 S. 10th Ave., La Grange, Ill.



Portable Pipe Threader

Port-A-Pony is an electric pipe threading tool for use with seven standard die stocks. It may be carried and operated by one person, and will thread pipe from ¼ to 2 inches. It is powered by a ½-hp., 60-cycle 110-volt universal motor, single-phase, forward and reverse.

In addition to use with a standard pipe vise, the maker says that this 26-lb. unit will thread pipe in place, between joists, in narrow trenches, overhead, and within five inches of walls.

The Thread-Ezy Mfg. Co., Corunna, Mich.

ALL TYPES STANDARD AND SPECIAL
FLOOR TRUCKS SINCE 1879
WHEELS ORANGEVILLE CASTERS
Write for catalog or see your Orangeville Distributor
ORANGEVILLE MFG. CO. Orangeville 4, Pa.

Conveying Systems
Service-Engineered
Conveyors of Every Type
PACKAGE or BULK
All types of Metal Fabrication
THE CONVEYOR CO.
25 Kempton Place,
West Newton, Mass.
Specialists in Materials Handling

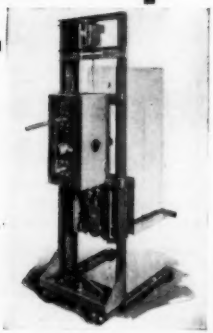
Pipe Repair
CLAMPS
Made for every type of leak — any temperature or pressure. Send for Catalog No. 41-O.
M. B. SKINNER CO., SOUTH BEND 21, INDIANA

PRINTED CELLOPHANE
Colorful - Self Adhesive - Cellophane, processed in Rolls. Easy to buy - Easy to apply - used for Packaging - Point of Sale advertising - Parts marking and Aircraft Wire terminal identification.
TOPFLIGHT TAPE - YORK, PA.

ALLEN
FLUX
for
SODERING
SILVER SODERING
WELDING
BRAZING
L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

HEAT where and when needed
LEE
DIRECT FIRED WARM AIR HEATERS
MEET EVERY NEED FOR HEAT
• for industrial buildings •
• 80-85% EFFICIENT
• AUTOMATIC WITH ANY FUEL
• 300,000 TO 8,000,000 BTU CAPACITY
• FLOOR, WALL OR ROOF MOUNTED
• LARGE CENTRAL HEATERS AND PROCESS HEATERS ALSO AVAILABLE.
WRITE FOR BULLETIN NO. 10
LEE ENGINEERING CO.
91 RIVER STREET
HOBOKEN, NEW JERSEY

TURN NON-PRODUCTIVE MAN-HANDLING TIME INTO PROFITABLE PRODUCTIVE TIME



The UPLIFTER

Dual Capacity Portable Elevator—Low in Cost—High in Savings

Same Two Speed Hand Hoist as on our more expensive elevators. Easy to lift—only 17 lbs. handles pressure with 1000 lbs. capacity. Small overall length 41¼" and width 24". Will operate in narrow aisles. Height 6'5" will clear any door.

Weight 415 lbs
Height of Lift 62"

The Uplifter is ideal for handling dies, loading and unloading, feeding, positioning, piling, stacking and in many other man and money-saving ways.

Price Only

$235 with floor lock

$295 with floor lock and broken cable safety.

We can help you with your warehousing and other material handling. Send us your particular requirements.

REVOLVATOR CO.

8761 Tonnele Ave., N. Bergen, N. J.

Revolvator Co.
8761 Tonnele Ave., North Bergen, N. J.
Send us illustrated folder and full details on the Uplifter.

Name .....

Title .....

Company .....

Address .....

SELF-PRIMING CENTRIFUGAL PUMPS WITH V-BELT DRIVE

Now! for the first time
AN EFFICIENT SELF-PRIMING CENTRIFUGAL PUMP

By simply changing pump speeds, Gorman-Rupp adapts just five pump sizes, 1½" to 6", to an almost unlimited number of conditions, ranging up to 1200 GPM and heads up to 110 feet. Also close-coupled units and flexible coupling drives.

Write us concerning your pumping problems. Ask for Bulletin 8IP-11.

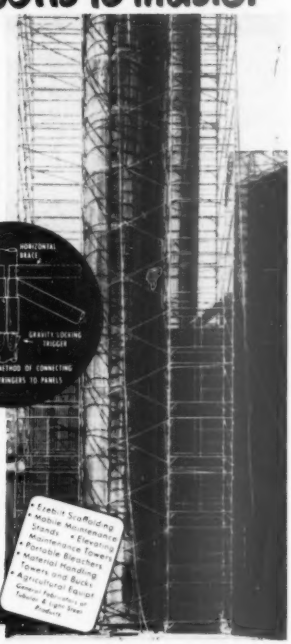
THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

"Up Faster—no bolts to master"

with

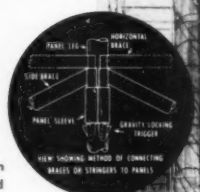
Ezebilt

STEEL PANEL SCAFFOLDING



HERE'S THE MAGIC

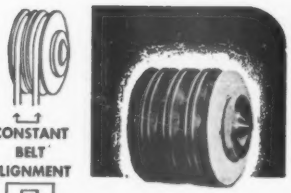
It's our exclusive "Gravity Lock" sleeve arrangement . . . . absolutely no bolts, no nuts, no tools for connecting or dismantling.



• There's unusual flexibility in Ezebilt Steel Panel scaffolding and guaranteed faster erection and dismantling time, thanks to the magic gravity lock sleeve arrangement which eliminates time-consuming tightening of bolts and nuts. It all adds up to scaffolding payroll dollars saved when you *own* or *rent* Ezebilt.

Send for Illustrated Bulletin Dept. 28
Distributors in All Principal Cities

UNIVERSAL
MANUFACTURING CORP. ZELIENOPLE, PA.
World's Largest Manufacturer of Steel-Panel Scaffolding



CONSTANT BELT ALIGNMENT

MAXIMUM PITCH VARIATION

INTERCHANGEABLE HUBS

USES STANDARD COMPANION SHEAVES

BELT MAXI-PICH SHEAVES

Increase production capacity, lower production costs . . . with "V-Belt" Maxi-Pich Sheaves. Simple handwheel controls speed, giving 2 inch pitch variation. Constant belt alignment, standard companion sheaves and interchangeable hubs save installation and operating costs. Write for catalog and name of nearest dealer.

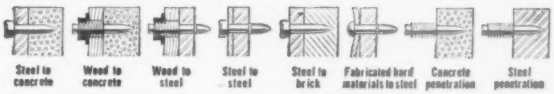
V-BELT ENGINEERING COMPANY
Richmond, Virginia

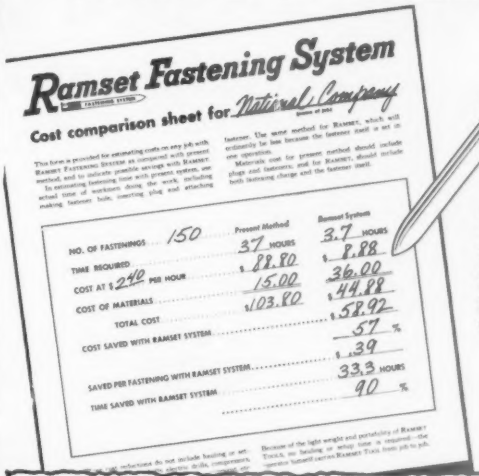
Pittsburgh Chain-Link Fence

For complete protection of your property and equipment consult our chain-link fence experts. They will plan an economical installation and give you a free cost estimate. Write today!

PITTSBURGH STEEL COMPANY
GRANT BUILDING, PITTSBURGH 30, PA.

SAVE MONEY, TIME, TROUBLE ON FASTENING JOBS LIKE THESE WITH RAMSET SYSTEM





Ramset Fastening System

Cost comparison sheet for National Company

	Present Method	Ramset System
NO. OF FASTENINGS	150	
TIME REQUIRED	37 HOURS	3.7 HOURS
COST AT $2.40 PER HOUR	$ 88.80	$ 8.88
COST OF MATERIALS	15.00	36.00
TOTAL COST	$103.80	$ 44.88
COST SAVED WITH RAMSET SYSTEM		$ 58.92
		57 %
SAVED PER FASTENING WITH RAMSET SYSTEM		$ .39
TIME SAVED WITH RAMSET SYSTEM		33.3 HOURS
		90 %

RAMSET FASTENERS available in 65 sizes and styles of drive pins and threaded studs, made of heat-treated, work-hardened, coated steel.

FIGURE OUT FOR YOURSELF WHAT Ramset FASTENING SYSTEM CAN SAVE!

Select any job of fastening or anchoring into steel, concrete, masonry or other materials as shown above. Then, use RAMSET's free Cost Comparison Sheet to compare slow, laborious, costly chipping and plugging, drilling and tapping with the amazingly fast, simple, economical RAMSET FASTENING SYSTEM.

Thousands of RAMSET users are profiting every day from big savings on their fastening jobs. That's because it takes less than a minute, from start to finish to *"Ramset"* a drive pin or threaded stud, to fasten materials together or to provide an anchor. Just READY! RAM! SET! Quick as lightning, the simple, self-powered, easy-to-use RAMSETTER does the work.

INVESTIGATE RAMSET! Save money on jobs you are doing with your own men. Insist upon contractors using RAMSET SYSTEM on work they are doing for you. Ask your local dealer or write us for details and free Cost Comparison Sheets.

Stemco Corporation, Cleveland 16, Ohio

© 1949 by Stemco Corp.

YOU CAN FASTEN FASTER, EASIER, AT LESS COST WITH Ramset FASTENING SYSTEM

Checklist of new and standard books in the McGRAW-HILL INDUSTRIAL ORGANIZATION and MANAGEMENT SERIES

Consulting Editor

L. C. MORROW

Editor, *Factory Management and Maintenance*

1. Constructive Collective Bargaining

This intensive analysis of collective bargaining points the way to better employer-employee relations through application of democratic bargaining techniques. Shows it as an effective means for satisfying both employers' and workers' requirements. By E. T. CHEYFITZ. $2.50

2. Understanding Labor

Here is a sound appraisal of labor unions, aimed at peaceful settlements through an examination of the wrong turns and fallacies which have made trouble in the past. It erects a workable principle of union organization and representation, and discusses the pro's and con's of labor legislation. By B. H. FITZPATRICK. $2.50

3. Vitalizing the Foreman's Role in Management

Shows how to ensure plant efficiency and cooperation by making your foremen an active part of the management team. Scores of case studies describe programs that other companies have set up to give foremen a more active role in carrying out management duties and responsibilities. By G. and R. L. GARDINER. $3.50

4. The Foreman in Manpower Management

Gives you the "know-how" for more successful employee relations in the plant. Shows how to improve your leadership techniques; set up and maintain conditions which enable workers to function at top efficiency. By L. M. GILBRETH and A. R. COOK. $2.75

5. Management at the Bargaining Table

Tells what it pays to know in preserving management's leadership functions in negotiating collective-bargaining agreements. Fully outlines the procedures and effective techniques for negotiating the agreement. By L. H. HILL and C. R. HOOK. $3.50

6. Fundamentals of Successful Manufacturing

A manual of manufacturing fundamentals, suggestions, techniques, and case studies that can help you organize a new business—modernize an existing one. Lists many of the pitfalls to avoid in modern manufacturing. By G. G. HYDE. $3.00

7. Principles of Personnel Testing

This book shows how to hire and promote employees without guesswork—without wasting money. Effective procedures for selecting, validating, and using personnel tests in industry and business are examined. By C. H. LAWSHE. $3.50

8. Methods-Time Measurement

A sure guide to more efficient operating procedures in plant and office. Describes techniques involved in developing production standards without the use of the stop watch. By H. B. MAYNARD, G. J. STEGEMERTEN, and J. L. SCHWAB. $3.75

9. Job Evaluation and Employee Rating

Here is a plan that assures a fair wage and salary distribution in your plant. The book shows how to install and maintain an efficient system of appraising jobs and rating workers. By R. C. SMYTH and M. J. MURPHY. $3.00

10. Making Conference Programs Work

Explains how to make conferences produce the results you want. Tells how to fit a conference program into your organization, and shows how to master every step in leading an informal conference from start to finish. By M. F. STIGERS. $3.50

11. Management Can Be Human

Provides common-sense advice for gaining a happy, productive working force that is loyal to the company, cooperative with supervisors, and enthusiastic about the work. By H. STOWERS. $2.25

12. Engineering Organization and Methods

Presents a specific plan and detailed methods for organizing, operating, and controlling product-design engineering departments. Based on the techniques proved most successful in many industries. By J. E. THOMPSON. $4.00

13. Employees Are People

A book that shows how to get the best employees available, and to maintain healthy employer-worker cooperation. Shows how to direct and organize personnel activities—how to set up a more efficient personnel department. By H. K. TOOTLE. $4.00

14. Personnel Manual for Executives

Illuminates all the possibilities of psychologized instruction and provides a practical treatment of the daily problems of supervision. Attention is directed to motivation and selling ideas, improved methods, use of sound business principles, etc. By R. YOUNG. $2.75

OTHER SELECTIONS FROM THIS SERIES

15. **Industrial Organization and Management.** By L. L. Bethel, et al. $5.00
16. **Job Placement of the Physically Handicapped.** By C. D. Bridges. $4.00
17. **A Human Relations Casebook for Executives and Supervisors.** By F. S. and C. A. Drake. $3.00
18. **Employee Counseling.** By N. Cantor. $2.50
19. **Salary and Wage Administration.** By R. W. Ells. $2.25
20. **A Program for Personnel Administration.** By J. J. Evans, Jr. $1.75
21. **Training for Supervision in Industry.** By G. H. Fern. $2.50
22. **When Foreman and Steward Bargain.** By G. Gardiner. $3.00
23. **Pattern for Good Labor Relations.** By L. H. Hill. $3.00
24. **The Dynamics of Time Study.** By R. Presgrave. $3.00

FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., INC., 330 W. 42nd St., New York 18

Send me book(s) corresponding to numbers encircled below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24

Name .....

Address .....

City ..... Zone..... State.....

Company .....

Position F-Fac-12-49

This offer applies to U. S. only.

A DRY CHEMICAL EXTINGUISHER WITH TRIGGER-FINGER CONTROL

Here's dry chemical at its fire-fighting best—in *Kidde-designed* extinguishers.

Kidde Dry Chemical Extinguishers use the same simple, familiar principle of Trigger-Finger Control made famous by its performance on *Kidde* Carbon Dioxide (CO_2) Portables.

Pressure of a single finger on the trigger of a *Kidde* Dry Chemical Extinguisher opens the valves—and makes it work. Release the trigger—both valves close.

Small port at bottom of CO_2 outlet tube allows gas to fluff up the dry chemical. *No packing of chemical in chamber.* Powder discharges at top of chamber, through siphon. *No packing at hose connection.* Trigger-Finger Control eliminates shut-off valve at horn. *No packing in hose.* Baffle in horn gives better dispersion pattern. Made in 20 and 30 lb. models.

These are the dry chemical extinguishers you want for most effective action against outdoor fires in flammable liquids and electrical equipment. Mail coupon for literature.

Kidde

Walter Kidde & Company, Inc., 1232 Main Street, Belleville 9, N. J.
In Canada: Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Walter Kidde & Company, Inc.
1232 Main Street, Belleville 9, N. J.

Gentlemen: Please send me literature on your dry chemical extinguishers.

Name.....

Company.....

Address.....

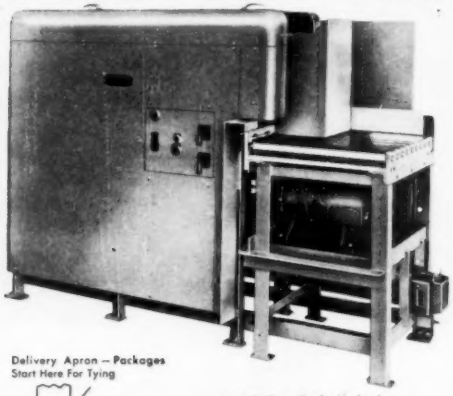
City.....State.....

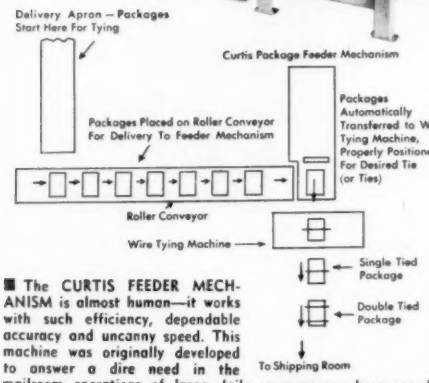
Cut Your Production Costs!
Eliminate Tying Bottlenecks!
with
CURTIS
PACKAGE FEEDER MECHANISM

■ Speeds Up Your Conveyor Operation—No More "Jams" in Tying Machines—MORE EFFICIENT PRODUCTION.

■ Bundles, Crates, Boxes or Cartons Are Automatically Positioned for Tying, and Tying Machine Is Started—FULLY AUTOMATIC OPERATION.

■ Ties 1, 2 or More Ties as Required—ALL TIES IDENTICAL.




Delivery Apron — Packages Start Here For Tying
Curtis Package Feeder Mechanism
Packages Placed on Roller Conveyor For Delivery To Feeder Mechanism
Packages Automatically Transferred to Wire Tying Machine, Properly Positioned For Desired Tie (or Ties)
Roller Conveyor
Wire Tying Machine
Single Tied Package
Double Tied Package
To Shipping Room

■ The CURTIS FEEDER MECHANISM is almost human—it works with such efficiency, dependable accuracy and uncanny speed. This machine was originally developed to answer a dire need in the mailroom operations of large daily newspapers where speed is essential and dependability a must. Thoroughly proved on many newspapers, the CURTIS Package Feeder is now adaptable to the tying requirements of industry in general for the tying of an unlimited range of products.

■ The CURTIS PACKAGE FEEDER MECHANISM prevents jams and regulates conveyor traffic. It will position your packages for tying with greater speed than can be equalled by the tying machine itself—therefore, you can get the very maximum efficiency out of your tying machine.

■ The CURTIS FEEDER MECHANISM is the most startling and important development in many years, a device that is most important to you.

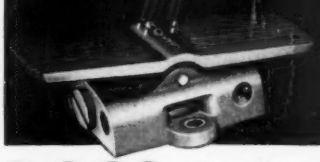
■ *TELL US what your problem is, enclose sketches and give us a complete picture for prompt recommendations.*

DON'T DELAY getting full details — WRITE TODAY.

CURTIS DEVELOPMENT & MFG. CO.
3264 North 33rd Street
Milwaukee 10, Wisconsin

SNAP and STAMINA!

NEVER BEFORE in this type of valve—ruggedness, reliability, low cost and low maintenance, PLUS the choice of foot or hand lever control. That's Ross' answer for small air cylinder use on machines where easy operation, continuous high production and compactness are "musts". It's Ross quality, of course, precision-machined brass and stainless steel construction, yet at a price you can't afford to pass up.



Available
¼" 3-way,
¼" 4-way,
Your choice foot or hand lever.

ROSS *Operating* **VALVE CO.**
120 E. GOLDEN GATE AVE. • DETROIT 3, MICH.

MAILING LISTS THAT WORK . . .

McGraw-Hill Industrial Mailing Lists are a direct route to today's purchase-controlling executives and technicians in practically every major industry.

These names are of particular value now when most manufacturers are experiencing constantly increasing difficulty in maintaining their own lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance during this period of unparalleled changes in industrial personnel. These lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nation-wide field staff, and are maintained on a twenty-four hour basis.

Investigate their tremendous possibilities in relation to your own product or service. Your specifications are our guide in recommending the particular McGraw-Hill lists that best cover your market. When planning your industrial advertising and sales promotional activities, ask for more facts or, better still, write today. No obligation, of course.

McGraw-Hill Publishing Co., Inc.
DIRECT MAIL DIVISION
330 West 42nd Street **New York, 18, N. Y.**

Here's Why it Pays You to Read the Advertising

The advertising is a rich source of valuable information. In this magazine it offers you ideas and products that may well apply advantageously to your business.

Every issue is a catalog of goods, materials, and services – quickly available to you – just for the reading.

Leaders in business and industry turn to the advertising because they've discovered it helps them run their businesses more profitably.

When you read all the ads in this magazine, the chances are good that you'll get a lead that will materially help you do a better job. For example, you may find a specific piece of equipment that will be a profitable time-saver. Or a tool that will increase worker efficiency. That's why it pays to read the advertising. It's good business.

McGRAW-HILL
publications

F-20

INDUSTRIAL CONSULTANTS

WALTER BEERMAN
Processing Processes
Manufacturing Processes
332 West 46 Street
New York 19

Help . . . *Fast*—
FACTORY'S Industrial Consultant Section offers the quickest, most direct method of contacting consultants who may be available . . . now.

GEMAR ASSOCIATES
Materials Handling Engineers
Warehousing—Plant Layout
Production Handling
Greenwich Connecticut

A. J. BOYNTON AND COMPANY
Engineers and Technical Counselors
Designers and Builders
of
Industrial Plants
and
Equipment
58 East Washington Street Chicago 2, Illinois

GREGORY M. DEXTER, C.E., M.E.
Consulting Engineer
Longacre 4-3881
Empire State Building, New York 1, N. Y.

MIKE KRASILOVSKY ASSOCIATES
Consultants • Engineers • Contractors
28 Years of Know How
Specializing in Industrial Plant Movements Anywhere
Machinery Motorized • Plant Layouts
Conveyors Fabricated to Order
Budget Figures Submitted CAnal 6-1128
222 Centre Street New York 13, N. Y.

W. H. BUCHHAGEN & CO.
Mechanical, Industrial, Management Engineers
Chemical & industrial plant design, construction consolidation, modernization, rehabilitation. Plant layout, material handling, production control, methods & procedures—cost reduction.
Mitchell 2-2698
972 Broad St. Newark 2, N. J.

DRAKE, STARTZMAN, SHEAHAN, BARCLAY, INC.
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
70 East 45th Street New York 17, N. Y.

METHODS ENGINEERING COUNCIL
H. B. MAYNARD, President
Consultants in Industrial Management
Time and Motion Study—Job Evaluation
Wage Incentives—Merit Rating
Installations—Training
822 Wood Street—Pittsburgh (21), Pa.

EUGENE BURK
Engineer and Architect
Architectural Planning & Structural Design
for more efficient production
in your plant and office.
Inquiries invited.
161 E. 31st St., New York 22, N. Y. WA 6-2813

THE EMERSON ENGINEERS
Management Counselors Since 1899
Plans — Controls — Incentives
for
Profit Making Management
30 Rockefeller Plaza New York 20, N. Y.

ALLAN H. MOGENSEN
DIRECTOR
Work Simplification Conferences
330 W. 42nd Street Box 30
New York City Lake Placid, N. Y.

Valuable Help for You

and your

SUPERVISORY STAFF

in

FACTORY'S PLANT OPERATION LIBRARY

Reprints of some of FACTORY'S best recent articles on a wide variety of

PRODUCTION, MAINTENANCE AND LABOR SUBJECTS

For complete list see page 271

FACTORY MANAGEMENT AND MAINTENANCE

CHIEF INDUSTRIAL ENGINEER

An old, reliable, high regarded management consulting firm in Chicago has need for an experienced Industrial Engineer to add to its permanent staff. Will assist in directing industrial engineering and production work with clients. Must have background of merit in industry. Engineering training essential. Age, 35-50. Give experience and personal description. Replies held confidentially.

P-1430, Factory Management & Maintenance
520 N. Michigan Ave., Chicago 11, Ill.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

TIME STUDY and Methods Engineer. Must be thoroughly experienced, preferably in woodworking industry. Give full details experience, education, age, salary in first letter. Write P 1336, Factory Management & Maint.

EMPLOYMENT SERVICES

SALARIED PERSONNEL. $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D, 241 Orange St., New Haven, Conn.

"MR. EMPLOYER" Thru 45 years experience as Staff Builders for leading industries, we have available a great group of Top-Flight Engineers, Chemists, Operations Managers, Production Managers, Sales and Advertising Executives; Comptrollers—executives adequate to meet your most exacting needs. Send us your job specifications. We will match them with candidates who "measure up." Western Employment, L. S. Monson, Manager, Sharp Bldg., Kansas City, Mo.

EXECUTIVES—CONTEMPLATING a change? Your personal requirements met thru our flexible procedures, affording full protection of your present position. We have the know-how and the nationwide contacts to negotiate successfully for you. Details on request, mailed under confidential cover. Jepson Executive Service (Est. 1939), 1043 Porter Bldg., Kansas City 2, Mo.

POSITIONS WANTED

EXECUTIVE ENGINEER M.E. with machinists background. Sixteen years in charge of engineering shops and related functions. Development, construction and maintenance of special machinery and equipment involving all trades (170 Mechanics). Will locate anywhere. Available on notice. PW 1439, Factory Management & Maint.

SALARIED POSITIONS $3,500—$35,000.
If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.
R. W. BIXBY, Inc., 276 Dun Bldg., Buffalo 2, N.Y.

EXECUTIVES AND TECHNICAL MEN
Desiring Positions with Stability
We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $25,000 per year. Confidential Est. 34 years.
(Inquiries from Employers entail no obligation)
THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

EXECUTIVES INTERESTED IN CHANGING POSITIONS
Make use of our continuous nationwide contacts. We offer a unique, confidential & discreet service to Executives desiring to contact employers. Write for details.
MUTUAL POSITIONS PLAN ASSOCIATION
55 William Street, New York 5, N. Y.
(A Mutual, Non-Profit Membership Organization.)

MANUFACTURING EXECUTIVE
Broad successful industrial experience directing and coordinating all Manufacturing, Purchasing, Planning, Engineering and Production. Aggressive, cost minded, resourceful. Excellent references.
PW-1317, Factory Management & Maint.
520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS WANTED

MATERIALS HANDLING Engineer: Staff Man. Experienced in organizing and controlling multiple plant operations. Capable of installing complete handling systems; training personnel and developing controls. Besides experience with conveyors, fork trucks, cranes, hoists, monorails and allied equipment have packaging and carloading background. Take long or short term job. PW 1385, Factory Management & Maint.

PROFESSIONAL ENGINEER, N. Y. State License, desires to represent manufacturer of engineering material in New York area. Gerard Witt, 132 Nassau St., New York 7, N. Y. Worth 4-1163.

SELLING OPPORTUNITY WANTED

MANUFACTURERS AGENT: Additional lines wanted for eastern mass-production companies. Background as chief engineer; includes high speed precision tooling. SA 1445, Factory Management & Maint.

SPECIAL SERVICE

U.C.E.Z. Time Study Boards, and Stop Watches, Time Study forms in stock. Large selection. Write for samples. Oznam Products, 5542 So. Homan, Chicago 29, Ill.

ARE YOU QUALIFIED
Wear the emblem that distinguishes leadership in the
AMERICAN SOCIETY OF INDUSTRIAL ENGINEERS
Engineering Building, Suite 200
205 W. Wacker Drive
Chicago 6, Ill.

UNUSUAL OPPORTUNITY

TO BUILD LARGE, SOUND, STEADY REPEAT BUSINESS

Revolutionary patented lock device, use it as a nut or adaptor, no turning, no shouldering; no removing of any parts in assembly when applying this; just slip it on sideways at spot where it has to function; a slight twist locks it as fast as a wink of an eye. Applied pressure cannot move it, use it between bends, many features and resultant savings of time and money, nothing like it, every industry a potential user, topnotch companies need service now; consider outright sale of patents or offer to finance a sound repeat business, financially capable party only, write for interview in Chicago to P. O. Box 776, Chicago 90, Ill.

WANTED

Fork Lift Trucks	Warehouse Trailers (Rubber Tires)
Hand Pallet Truck	
Hand Electric Trucks	Krane Kars

We Pay High Prices for
USED HANDLING EQUIPMENT
A. & A. MACHINERY CORP.
1267 Flushing Avenue, Brooklyn, N. Y.

AMERICAN

A Good Name to go by

Buy

COMPRESSORS

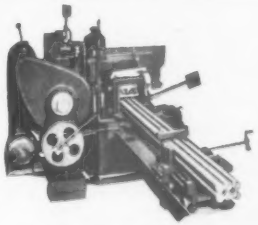
Rebuilt and Guaranteed by AMERICAN

Sale • Rent • Rebuilt and Purchase

STATIONARY • PORTABLE

ALL MAKES • ALL SIZES
VACUUM PUMPS • AFTERCOOLERS
RECEIVERS • ACCESSORIES

American Air Compressor Corp.
4700-4800 Dell Ave. North Bergen, N. J.



#9A MARVEL AUTOMATIC BAR FEED HACKSAW

New 1944—Like new condition. Complete with all extra equipment for feeding nested bar stock.

Strom-Johnson Machinery Co.
8800 S. Vincennes Ave., Chi. 20, Ill.

WANTED

SURPLUS ABRASIVES
SHEETS - ROLLS - BELTS
IN
ALUMINUM OXIDE
SILICON CARBIDE
GARNET • EMERY • FLINT
Must Be in Perfect Condition
Royale Abrasive Company
2272 Logan Blvd., Chicago 47, Ill.

SEND your TRANSFORMERS to ELECTRIC SERVICE CO., INC.

A financially responsible organization specializing in buying, selling, repairing, rewinding and redesigning transformers only.

Experienced personnel assures you first class workmanship and complete satisfaction.

Every transformer guaranteed for one year

The Electric Service Co., Inc.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
MARIEMONT Since 1912 CINCINNATI 27, OHIO

Additional Position Vacant Advertisement on Page 268

Index To Advertisements

Abrasive Products, Inc. 196
Acme Steel Company 163
Adam Electric Co., Frank 137
Air Express Div., Railway Express 258
Ajax Engineering Corp. 270
Ajax Flexible Coupling Co. 260
Allegheny-Ludlum Steel Corp. 16
Allen Co., Inc., L. B. 275
Allen-Bradley Company Insert, 146, 147
Allis-Chalmers Mfg. Co. 9, 161
Aluminum Co. of America 165, 235
Alvey-Ferguson Company 204
American Air Filter Co. 172
American Brake Shoe Co. (National Bearing Div.) 157
American Brass Company 32
American Gas Association 255
American Hoist & Derrick Co. 230
American Hot Dip Galvanizers Assn. 190
American Mutual Liability Insurance Co. 26, 27
American Optical Company 125
American Pulley Company 236
American Screw Company 17
American Structural Products Co. 265
Anaconda Wire & Cable Co. 197
Appleton Electric Company 154
Arco Company 206

Baker-Raulang Company 7
Bausch & Lomb Optical Co. 238
Belfield Valve Division, Minneapolis-Honeywell Regulator Co. Insert 16B
Black, Sivalls & Bryson, Inc. 191
Blackhawk Mfg. Co. 229
Blanchard Machine Co. 259
Blue Ridge Glass Corp. 261
Bostitch, Inc. 142, 143
Bradley Washfountain Co. 246
Brown & Sharpe Mfg. Co. 215
Brown Instrument Div., Minneapolis-Honeywell Regulator Co. 141, 270
Bruning Company, Inc., Charles 224
Buell Engineering Co., Inc. 262
Buffalo Fire Appliance Corp. 199
Bulldog Electric Products Co. 223
Bunting Brass & Bronze Co. 151

Cambridge Wire Cloth Co. 146
Carborundum Company 24, 25
Century Electric Company 173
Chain Belt Company 22, 23
Chicago Metal Hose Corp. 155
Chicago Pneumatic Tool Company 269
Clapp & Poliak, Inc. 212
Clark Controller Co. 175
Clark Equipment Co., Industrial Truck Div. 214
Cleveland Crane & Engineering Co. 286
Cone Automatic Machine Company 213
Conveyor Co. 275
Crane Company 221
Crescent Insulated Wire & Cable Co. 190
Cullen Friestedt Co. 256
Curtis Development & Mfg. Co. 280
Curtis Pneumatic Machinery Co. 47

Darnell Corporation, Ltd. 242
Day-Brite Lighting Co. 181
De Laval Steam Turbine Co. 263
Detroit Steel Products Co. 231
De Vilbiss Company 171
Dolge Company, C. B. 234
Dow Chemical Company 216
Dow Corning Corporation 252
Dracco Corporation 198
DuPont de Nemours & Co., E. I. (Rayon Division) 139

Eastman Kodak Company 159
Edison Storage Battery Div., Thomas A. Edison Co. 160
Electric Controller & Mfg. Co. 244
Electric Storage Battery Co. 123
Electric Industrial Truck Assn. 166
Electro-Dynamic Div., Electric Boat Co. 239
Electro Rust-Proofing Corp. 234
Elwell-Parker Electric Co. 10

Factory Management & Maintenance 271
Fairbanks Morse & Company 6
Fedders-Quigan Corp. 274
Felters Company 208
Fenwal, Incorporated 232
Finnell System, Inc. 203
Foote Bros. Gear & Machine Corp. 273
Fostoria Pressed Steel Co. 225

General Box Company 180
General Electric Company (Apparatus Dept.) 14, 15, Insert 32, 33, 38, 39, 168, 186 192, 193, 228 237, 267
General Electric Company (Commercial Appliances) 147
General Electric Company (Lamp Div.) 18
General Gas Light Co. 176
Goodrich Company, B. F. 1
Goodyear Tire & Rubber Company 31
Gits Bros. Mfg. Co. 144
Gorman-Rupp Company 276
Gulf Oil Company 35

Hamilton Tool Co. 274
Harnischfeger Corporation 187, 211
Harper Company, H. M. 245
Harrison Radiator Div., General Motors Corp. 40
Hauserman Co., E. F. 253
Hercules Powder Company 153
Hinde & Dauch Paper Co. 4
Hobart Brothers Co. 275
Hobbs Mfg. Co. 275
Hood Rubber Company 176
Howell Electric Motors Company 227
Hyatt Bearing Div., General Motors Corp. 127

Indiana Dept. of Commerce and Public Relations 170
Industrial Control Div., Square D Company 179, Third Cover
Inland Steel Company 152
International Business Machine Corp. 30
Invincible Vacuum Cleaner Co. 233

Jenkins Bros. 33
Johns-Manville Corp. 241, 254
Johnson Bronze Company 148
Johnson Steel & Wire Co., Inc. 256

Keasbey & Mattison Co. 44
Keller Tool Company 135
Kester Solder Company 150, 246
Kex National Service 140
Kidde & Co., Inc., Walter 279
Kimberly-Clark Corp. 266

Lamson & Sessions Co. 41
Lee Engineering Co. 275
Link-Belt Company 8
Lunkenheimer Company 184
Lyon Metal Products Co. 243
Lyon-Raymond Corporation 270

Mahon Company, R. C. 46
Manheim Mfg. & Belting Co. 167
Manning Maxwell & Moore, Inc. 194
Master Electric Company Fourth Cover

McCaskey Register Company 138
McGraw-Hill Book Co. 278
Mercury Mfg. Co. 226
Midland Industrial Finishes 260
Minneapolis-Moline Power Implement Co. 212
Minnesota Mining & Mfg. Co. 248
Mobilift Corporation 195
Modine Mfg. Co. 145

National Bearing Div., American Brake Shoe Co. 157
National Electric Products Co. Second Cover
National Screw & Mfg. Co. 182
Norton Company 34

Ohio Injector Company 240
Orangeville Mfg. Co. 275
Osborn Manufacturing Co. 12
Ozalid Division of General Aniline & Film Corp. 188

Pangborn Corporation 158
Photoswitch, Inc. 149
Pittsburgh-Corning Corp. 42, 43, 209
Pittsburgh Plate Glass (Paints) Insert 16A
Pittsburgh Steel Products Co. 277
Production Instrument Company 274

Railway Express Agency, Inc. 234
Ready-Power Company 164
Reliance Electric & Engineering Co. 28, 29
Republic Steel Corporation 177
Revolvator Co. 276
Rivett Lathe & Grinder, Inc. 268
Rockwell Mfg. Co., Power Tool Div. 247
Roebling's Sons Co., John A. 207
Roots-Connersville Blower Corp. 133
Ross Operating Valve Co. 280
Ryerson & Son, Joseph T. 2

Sauereisen Cements Co. 275
Schramm, Inc. 272
Schulman Company, A. 285
Silent Glow Oil Burner Corp. 146
SKF Industries, Inc. 13
Skilsaw, Inc. 189
Skinner Company, M. B. 275
Smith Corporation, A. O. 250
Smooth Ceilings System Co. 264
Spang-Chalfant Div., National Supply Co. 183
Speedi-Dri Corp. 174
Square D Company 179, Third Cover
Standard Conveyor Company 222
Standard Oil of Indiana 169
Standard Pressed Steel Co. 251
Stanley Electric Tool Div., Stanley Works, Inc. 162
Stemco Corporation 277
Stephens-Adamson Mfg. Co. 5
Stuart Oil Co., Ltd., D. A. 202
Synthane Corporation Insert 162, 163

Taylor Company, Halsey W. 230
TelAutograph Corporation 131
Texas Company 48
Thermoid Company 45
Thomas Flexible Coupling Co. 136
Toledo Scale Company 210
Tomkins-Johnson Company 249
Top-Flight Tape Co. 275
Tinnerman Products, Inc. 36
Trane Company 260
Trumbull Electric Co. 205

Udylite Corporation 257
Unistrut Products Co. 268
Universal Manufacturing Corp. 276
U. S. Gutta Percha Paint Co. 19

V-Belt Engineering Company 277
Valley Electric Corporation 176
Vaughan Crane Co., Ltd. 275
Veeder-Root, Inc. 11

Wagner Electric Company 217
Webb Co., Jervis B. 156
Westinghouse Electric Corp. 200, 201, 218, 219
Westinghouse Electric Corp. (Lamp Div.) 20, 21
Willson Products, Inc. 178
Wilson Co., K. R. 37
Wirebound Box Mfrs. Assn. 266
Wright Hoist Div. (American Chain & Cable Co. 185

Young Radiator Company 220

■

INDUSTRIAL CONSULTANTS 282

■

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant 283
Positions Wanted 283
Selling Opportunities Wanted 283
Employment Services 283

SPECIAL SERVICES
Rebuilding 283
Repairing 283

BUSINESS OPPORTUNITIES
Offered 283

EQUIPMENT
(Used or Surplus New)
For Sale 283

RUBBER
SHIMS • WASHERS
PADS • LINERS
SEALS • SHIELDS
Designed to Fit Your Purpose

Supplying industry with rubber shapes for every purpose and for any design and size. We are prepared to meet your specific requirements for special types, sizes, in any amount, large or small.

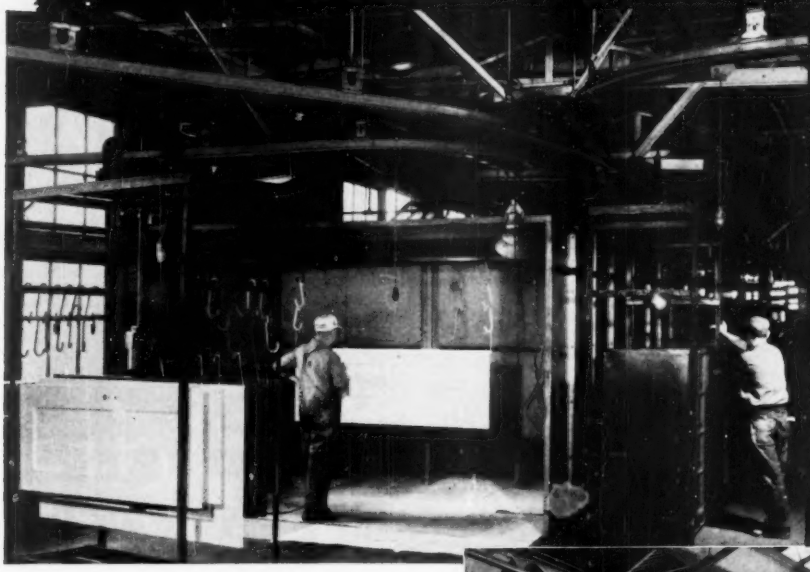
For prompt estimates and prices based on your needs and specifications — write or telephone your nearest Schulman office.

A. Schulman Inc.

Akron, O. * New York City
Boston, Mass. * Jersey City, N. J.
E. St. Louis, Ill. * Huntington Park, Calif.

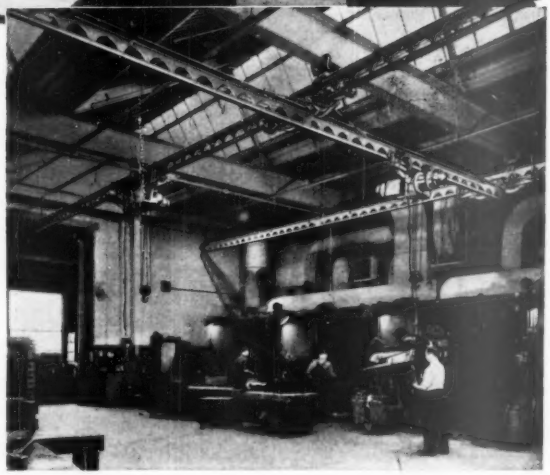
Main Office and Plant:
790 E. Tallmadge Ave., Akron 9, O.

handle freshly painted parts the *EFFICIENT OVERHEAD way*



This rack carrier system speeds the painting of metal doors and filing cabinets. The items are conveyed to and from the spray booth in an even flow without log-jamming.

A three-runway crane simplifies handling of ironing machines and other laundry equipment in this paint room. The middle runway track extends to other parts of the building, enabling loads to be brought directly to the room by the hoist carrier seen at left.



PAINTING and handling parts or complete machines is greatly simplified and speeded by use of an inexpensive Cleveland Tramrail overhead system.

Items may be delivered from fabrication department, painted by spray or dip, and conveyed to assembly or shipping without leaving the tramrail system. Freshly painted pieces are easily moved the overhead way with little danger of being touched or damaged.

Various types of Cleveland Tramrail equipment are available to suit different conditions. Whether it be cranes, rack carrier systems or completely automatic installations, Cleveland Tramrail engineers can advise and serve you.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3208 East 284th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

2-WAY PROTECTION WITH SQUARE D CIRCUIT BREAKERS

RESIDENTIAL and INDUSTRIAL

THERMAL-(Coilless)-MAGNETIC

—combining the proven advantages of both Thermal and Magnetic tripping elements. They give positive protection against dangerous overloads and act instantaneously on "shorts." Useless tripping on harmless momentary overloads is eliminated.

1. **THERMAL** element is a bi-metal providing positive and timed response to heating effects of both load current and surrounding atmosphere. The life of wire insulation is prolonged by limiting total temperature to a safe value.

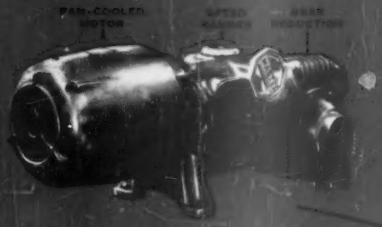
2. **MAGNETIC** element responds instantaneously to the higher values of current characteristic of dangerous overloads and "shorts." Damage is minimized.

Write for Bulletin SA 590
Square D Company, 6060 Rivard Street,
Detroit 11, Michigan

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S. A., MEXICO CITY, D. F.



You too can give your jobs that extra punch by taking advantage of Master's unusual ability to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT construction features, the RIGHT mounting . . . all combined into one compact power package.

Don't put up with make-shift assemblies when you too may be enjoying these advantages. Master motors, available in millions and millions of types and ratings (up to 150 HP) give you a selection you can get nowhere else.

Open, enclosed, splash proof, fan-cooled explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU.

Give them the old "one-two" punch

Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor driven products . . . improve the economy and productivity of your plant equipment.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO